International Journal of Mathematical Sciences and Applications
Vol. 1 No. 1 (January, 2011)
Copyright © Mind Reader Publications
www.ijmsa.yolasite.com

DEVELOPMENT OF TWO SUMMATION FORMULAE USING RECURRENCE RELATION OF GAMMA FUNCTION

Salahuddin

P.D.M College of Engineering,
Bahadurgarh ,Haryana,India
E-mails: sludn@yahoo.com ; vsludn@gmail.com

ABSTRACT

The aim of the present paper is to obtain two summation formulae based on half argument using recurrence relation of Gamma function.The results are general in nature.

A.M.S. Subject Classification (2000): 33C60 , 33C70

Key words and Phrases: Contiguous relation, Gauss second summation theorem .

A. INTRODUCTION

Generalized Gaussian Hypergeometric function of one variable is defined by

$$ {}_AF_B\left[\begin{array}{ll} a_1, a_2, \cdots, a_A & ; \\ & \\ b_1, b_2, \cdots, b_B & ; \end{array} z\right] = \sum_{k=0}^{\infty} \frac{(a_1)_k (a_2)_k \cdots (a_A)_k z^k}{(b_1)_k (b_2)_k \cdots (b_B)_k k!} $$

or

$$ {}_AF_B\left[\begin{array}{ll} (a_A) & ; \\ & \\ (b_B) & ; \end{array} z\right] \equiv {}_AF_B\left[\begin{array}{ll} (a_j)_{j=1}^{A} & ; \\ & \\ (b_j)_{j=1}^{B} & ; \end{array} z\right] = \sum_{k=0}^{\infty} \frac{((a_A))_k z^k}{((b_B))_k k!} \tag{1} $$

where the parameters $b_1, b_2, \cdots, b_B$ are neither zero nor negative integers and $A,\ B$ are non-negative integers.

Contiguous Relation is defined by

[Andrews p.363(9.16), E. D. p.51(10), H.T. F. I p.103(32)]

$$ (a-b)\ {}_2F_1\left[\begin{array}{ll} a,\ b & ; \\ c & ; \end{array} z\right] = a\ {}_2F_1\left[\begin{array}{ll} a+1,\ b & ; \\ c & ; \end{array} z\right] - b\ {}_2F_1\left[\begin{array}{ll} a,\ b+1 & ; \\ c & ; \end{array} z\right] \tag{2} $$

Gauss second summation theorem is defined by [Prud., 491(7.3.7.5)]

$$ {}_2F_1\left[\begin{array}{c} a,\ b\ ; \\ \frac{a+b+1}{2}\ ; \end{array} \quad \frac{1}{2}\right] = \frac{\Gamma(\frac{a+b+1}{2})\ \Gamma(\frac{1}{2})}{\Gamma(\frac{a+1}{2})\ \Gamma(\frac{b+1}{2})} \tag{3} $$

$$ = \frac{2^{(b-1)}\ \Gamma(\frac{b}{2})\ \Gamma(\frac{a+b+1}{2})}{\Gamma(b)\ \Gamma(\frac{a+1}{2})} \tag{4} $$

In a monograph of Prudnikov et al., a summation theorem is given in the form [Prud., p.491(7.3.7.3)]

$$ {}_2F_1\left[\begin{array}{c} a,\ b\ ; \\ \frac{a+b-1}{2}\ ; \end{array} \quad \frac{1}{2}\right] = \sqrt{\pi}\ \left[\frac{\Gamma(\frac{a+b+1}{2})}{\Gamma(\frac{a+1}{2})\ \Gamma(\frac{b+1}{2})} + \frac{2\ \Gamma(\frac{a+b-1}{2})}{\Gamma(a)\ \Gamma(b)}\right] \tag{5} $$

Now using Legendre's duplication formula and Recurrence relation for Gamma function, the above theorem can be written in the form

$$ {}_2F_1\left[\begin{array}{c} a,\ b\ ; \\ \frac{a+b-1}{2}\ ; \end{array} \quad \frac{1}{2}\right] = \frac{2^{(b-1)}\ \Gamma(\frac{a+b-1}{2})}{\Gamma(b)}\ \left[\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-1}{2})} + \frac{2^{(a-b+1)}\ \Gamma(\frac{a}{2})\ \Gamma(\frac{a+1}{2})}{\{\Gamma(a)\}^2} + \frac{\Gamma(\frac{b+2}{2})}{\Gamma(\frac{a+1}{2})}\right] \tag{6} $$

Recurrence relation is defined by

$$ \Gamma(z+1) = z\ \Gamma(z) \tag{7} $$

B. MAIN SUMMATION FORMULA

$$ {}_2F_1\left[\begin{array}{c} a,\ \ b\ ; \\ \frac{a+b+27}{2}\ ; \end{array} \quad \frac{1}{2}\right] = \frac{2^b\ \Gamma(\frac{a+b+27}{2})}{(a-b)\ \Gamma(b)} \times $$

$$ \times \left[\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a+1}{2})}\ \left\{\frac{4096a(316234143225 - 703416314160a + 590546123298a^2 - 264300628944a^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)} + \right. \right. $$

$$ + \frac{4096a(72578259391a^4 - 13137458400a^5 + 1628301884a^6 - 140529312a^7 + 8439783a^8)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)} + $$

$$+\frac{4096a(-345840a^9+9218a^{10}-144a^{11}+a^{12}-219830625000b+2368341306180ab)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(-806046993240a^2b+780221343260a^3b-112584499600a^4b+35861900520a^5b)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(-2569370160a^6b+358811640a^7b-12520200a^8b+817300a^9b-11000a^{10}b+300a^{11}b)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(1380437478090b^2-177787641120ab^2+1898646966530a^2b^2-204339507200a^3b^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(197154700500a^4b^2-11896225600a^5b^2+3808567700a^6b^2-118201600a^7b^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(16356450a^8b^2-202400a^9b^2+12650a^10b^2+196444101000b^3+1376649886700ab^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(-30674290400a^2b^3+390981756400a^3b^3-16713152400a^4b^3+15342044200a^5b^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(-401212000a^6b^3+122148400a^7b^3-1366200a^8b^3+177100a^9b^3+257166219575b^4)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(82836450400ab^4+308017819300a^2b^4-1544183200a^3b^4+27248195450a^4b^4)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(-482098400a^5b^4+412047300a^6b^4-3845600a^7b^4+1081575a^8b^4+22978396400b^5)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(92300279720ab^5+8838552240a^2b^5+22406440840a^3b^5-20801200a^4b^5+684359480a^5b^5)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(-4160240a^6b^5+3268760a^7b^5+8093571020b^6+3997024640ab^6+8366773940a^2b^6)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(303452800a^3b^6+577233300a^4b^6+5200300a^6b^6+406602000b^7+1279043800ab^7)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(172426400a^2b^7+244545200a^3b^7+2971600a^4b^7+4457400a^5b^7+59042775b^8+30866000ab^8)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(455400a^2b^9+49094650a^2b^8+1922800a^3b^8+2042975a^4b^8+1524600b^9+4073300ab^9)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096a(480700a^3b^9+98890b^{10}+40480ab^{10}+53130a^2b^{10}+1000b^{11}+2300ab^{11}+25b^{12})}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096b(316234143225-219830625000a+1380437478090a^2+196444101000a^3+257166219575a^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(+22978396400a^5+8093571020a^6+406602000a^7+59042775a^8+1524600a^9+98890a^{10})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(1000a^{11}+25a^{12}-703416314160b+2368341306180ab-177787641120a^2b)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(1376649886700a^3b+82836450400a^4b+92300279720a^5b+3997024640a^6b+1279043800a^7b)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(30866000a^8b+4073300a^9b+40480a^{10}b+2300a^{11}b+590546123298b^2-806046993240ab^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(1898646966530a^2b^2-30674290400a^3b^2+308017819300a^4b^2+8838552240a^5b^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(8366773940a^6b^2+172426400a^7b^2+49094650a^8b^2+455400a^9b^2+53130a^{10}b^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(-264300628944b^3+780221343260ab^3-204339507200a^2b^3+390981756400a^3b^3)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(-1544183200a^4b^3+22406440840a^5b^3+303452800a^6b^3+244545200a^7b^3+1922800a^8b^3)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(480700a^9b^3+72578259391b^4-112584499600ab^4+197154700500a^2b^4-16713152400a^3b^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(27248195450a^4b^4-20801200a^5b^4+577233300a^6b^4+2971600a^7b^4+2042975a^8b^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(-13137458400b^5+35861900520ab^5-11896225600a^2b^5+15342044200a^3b^5-482098400a^4b^5)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(684359480a^5b^5+4457400a^7b^5+1628301884b^6-2569370160ab^6+3808567700a^2b^6)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(-401212000a^3b^6+412047300a^4b^6-4160240a^5b^6+5200300a^6b^6-140529312b^7)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(358811640ab^7-118201600a^2b^7+122148400a^3b^7-3845600a^4b^7+3268760a^5b^7)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(8439783b^8-12520200ab^8+16356450a^2b^8-1366200a^3b^8+1081575a^4b^8-345840b^9)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(817300ab^9-202400a^2b^9+177100a^3b^9+9218b^{10}-11000ab^{10}+12650a^2b^{10}-144b^{11})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096b(300ab^{11}+b^{12})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}\Bigg\}-$$

$$-\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a}{2})}\Bigg\{\frac{8192(316234143225+219830625000a+1380437478090a^2-196444101000a^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(257166219575a^4-22978396400a^5+8093571020a^6-406602000a^7+59042775a^8)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(-1524600a^9+98890a^{10}-1000a^{11}+25a^{12}+703416314160b+2368341306180ab)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(177787641120a^2b+1376649886700a^3b-82836450400a^4b+92300279720a^5b)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(-3997024640a^6b+1279043800a^7b-30866000a^8b+4073300a^9b-40480a^{10}b+2300a^{11}b)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(5905461232 98b^2+806046993240ab^2+1898646966530a^2b^2+30674290400a^3b^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(308017819300a^4b^2-8838552240a^5b^2+8366773940a^6b^2-172426400a^7b^2+49094650a^8b^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(-455400a^9b^2+53130a^{10}b^2+264300628944b^3+780221343260ab^3+204339507200a^2b^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(390981756400a^3b^3+1544183200a^4b^3+22406440840a^5b^3-303452800a^6b^3+244545200a^7b^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(-1922800a^8b^3+480700a^9b^3+72578259391b^4+112584499600ab^4+197154700500a^2b^4)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(16713152400a^3b^4+27248195450a^4b^4+20801200a^5b^4+577233300a^6b^4-2971600a^7b^4)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(2042975a^8b^4+13137458400b^5+35861900520ab^5+11896225600a^2b^5+15342044200a^3b^5)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(482098400a^4b^5+684359480a^5b^5+4457400a^7b^5+1628301884b^6+2569370160ab^6)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(3808567700a^2b^6+401212000a^3b^6+412047300a^4b^6+4160240a^5b^6+5200300a^6b^6)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(140529312b^7+358811640ab^7+118201600a^2b^7+122148400a^3b^7+3845600a^4b^7)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(3268760a^5b^7+8439783b^8+12520200ab^8+16356450a^2b^8+1366200a^3b^8+1081575a^4b^8)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(345840b^9+817300ab^9+202400a^2b^9+177100a^3b^9+9218b^{10}+11000ab^{10}+12650a^2b^{10})}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(144b^{11}+300ab^{11}+b^{12})}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{8192(316234143225+703416314160a+590546123298a^2+264300628944a^3+72578259391a^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(13137458400a^5+1628301884a^6+140529312a^7+8439783a^8+345840a^9+9218a^{10})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(144a^{11}+a^{12}+219830625000b+2368341306180ab+806046993240a^2b+780221343260a^3b)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(112584499600a^4b+35861900520a^5b+2569370160a^6b+358811640a^7b+12520200a^8b)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(817300a^9b+11000a^{10}b+300a^{11}b+1380437478090b^2+177787641120ab^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(1898646966530a^2b^2+204339507200a^3b^2+197154700500a^4b^2+11896225600a^5b^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(3808567700a^6b^2+118201600a^7b^2+16356450a^8b^2+202400a^9b^2+12650a^{10}b^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(-196444101000b^3+1376649886700ab^3+30674290400a^2b^3+390981756400a^3b^3)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(16713152400a^4b^3+15342044200a^5b^3+401212000a^6b^3+122148400a^7b^3+1366200a^8b^3)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(177100a^9b^3+2571662195 75b^4-82836450400ab^4+308017819300a^2b^4+1544183200a^3b^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(27248195450a^4b^4+482098400a^5b^4+412047300a^6b^4+3845600a^7b^4+1081575a^8b^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(-22978396400b^5+92300279720ab^5-8838552240a^2b^5+22406440840a^3b^5+20801200a^4b^5)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(684359480a^5b^5+4160240a^6b^5+3268760a^7b^5+8093571020b^6-3997024640ab^6)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(8366773940a^2b^6-303452800a^3b^6+577233300a^4b^6+5200300a^6b^6-406602000b^7)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(1279043800ab^7-172426400a^2b^7+244545200a^3b^7-2971600a^4b^7+4457400a^5b^7)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(59042775b^8-30866000ab^8+49094650a^2b^8-1922800a^3b^8+2042975a^4b^8-1524600b^9)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(4073300ab^9-455400a^2b^9+480700a^3b^9+98890b^{10}-40480ab^{10}+53130a^2b^{10})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{8192(-1000b^{11}+2300ab^{11}+25b^{12})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}\Bigg\}\Bigg] \tag{8}$$

$${}_2F_1\left[\begin{matrix} a, \quad b \ ; \\ \frac{a+b+28}{2} \ ; \end{matrix} \quad \frac{1}{2}\right]=\frac{2^b\ \Gamma(\frac{a+b+28}{2})}{(a-b)\ \Gamma(b)}\times$$

$$\times\left[\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a}{2})}\left\{\frac{8192(1961990553600a-3044235018240a^2+1977916981248a^3-723975622656a^4)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+\right.\right.$$

$$+\frac{8192(168244950016a^5-26376979200a^6+2879374784a^7-221652288a^8+11991408a^9-446160a^{10})}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(10868a^{11}-156a^{12}+a^{13}+1961990553600b+10842988216320a^2b-2592851189760a^3b)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(2165934351360a^4b-260372403200a^5b+72362488640a^6b-4556672640a^7b+567206640a^8b)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(-17846400a^9b+1055340a^{10}b-13000a^{11}b+325a^{12}b+3044235018240b^2)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(10842988216320ab^2+6631413934080a^3b^2-541420588800a^4b^2+464469853120a^5b^2)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(-24008216960a^6b^2+6791844800a^7b^2-188130800a^8b^2+23351900a^9b^2-263120a^{10}b^2)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(14950a^{11}b^2+1977916981248b^3+2592851189760ab^3+6631413934080a^2b^3)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(1110897902400a^4b^3-38354476160a^5b^3+31411074240a^6b^3-721427200a^7b^3+195037700a^8b^3)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(-1973400a^9b^3+230230a^{10}b^3+723975622656b^4+2165934351360ab^4+541420588800a^2b^4)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(1110897902400a^3b^4+65580555040a^5b^4-986221600a^6b^4+746483400a^7b^4-6249100a^8b^4)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(1562275a^9b^4+168244950016b^5+260372403200ab^5+464469853120a^2b^5+38354476160a^3b^5)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(65580555040a^4b^5+1433202680a^6b^5-7726160a^7b^5+5311735a^8b^5+26376979200b^6)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(72362488640ab^6+24008216960a^2b^6+31411074240a^3b^6+986221600a^4b^6+1433202680a^5b^6)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(9657700a^7b^6+2879374784b^7+4556672640ab^7+6791844800a^2b^7+721427200a^3b^7)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(746483400a^4b^7+7726160a^5b^7+9657700a^6b^7+221652288b^8+567206640ab^8+188130800a^2b^8)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(195037700a^3b^8+6249100a^4b^8+5311735a^5b^8+11991408b^9+17846400ab^9+23351900a^2b^9)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(1973400a^3b^9+1562275a^4b^9+446160b^{10}+1055340ab^{10}+263120a^2b^{10}+230230a^3b^{10})}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(10868b^{11}+13000ab^{11}+14950a^2b^{11}+156b^{12}+325ab^{12}+b^{13})}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384b(1961990553600+640796590080a+2926061420544a^2+455233155072a^3+340141995008a^4)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(28612691200a^5+7810837952a^6+362197056a^7+44691504a^8+1063920a^9+61204a^{10})}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(572a^11+13a^12-640796590080b+6968782356480ab+616359260160a^2b)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(2205838356480a^3b+153884051200a^4b+102507765120a^5b+4331790400a^6b)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(1084021120a^7b+24653200a^8b+2774200a^9b+25740a^{10}b+1300a^{11}b+2926061420544b^2)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(-616359260160ab^2+3873632532480a^2b^2+136391692800a^3b^2+403163393600a^4b^2)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(13652851520a^5b^2+8055718720a^6b^2+165048000a^7b^2+37165700a^8b^2+328900a^9b^2)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(32890a^{10}b^2-455233155072b^3+2205838356480ab^3-136391692800a^2b^3)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(623645625600a^3b^3+9979681600a^4b^3+24972053120a^5b^3+400052800a^6b^3+208343200a^7b^3)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(1644500a^8b^3+328900a^9b^3+340141995008b^4-153884051200ab^4+403163393600a^2b^4)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(-9979681600a^3b^4+36049703200a^4b^4+261850400a^5b^4+562244200a^6b^4+3408600a^7b^4)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(1562275a^8b^4-28612691200b^5+102507765120ab^5-13652851520a^2b^5+24972053120a^3b^5)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(-261850400a^4b^5+777964880a^5b^5+2080120a^6b^5+3863080a^7b^5+7810837952b^6)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(-4331790400ab^6+8055718720a^2b^6-400052800a^3b^6+562244200a^4b^6-2080120a^5b^6)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(5200300a^6b^6-362197056b^7+1084021120ab^7-165048000a^2b^7+208343200a^3b^7)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(-3408600a^4b^7+3863080a^5b^7+44691504b^8-24653200ab^8+37165700a^2b^8-1644500a^3b^8)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(1562275a^4b^8-1063920b^9+2774200ab^9-328900a^2b^9+328900a^3b^9+61204b^{10})}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{16384b(-25740ab^{10}+32890a^2b^{10}-572b^{11}+1300ab^{11}+13b^{12})}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}\Bigg\}-$$

$$-\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a+1}{2})}\Bigg\{\frac{16384a(1961990553600-640796590080a+2926061420544a^2-455233155072a^3)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(340141995008a^4-28612691200a^5+7810837952a^6-362197056a^7+44691504a^8)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(-1063920a^9+61204a^{10}-572a^{11}+13a^{12}+640796590080b+6968782356480ab)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(-616359260160a^2b+2205838356480a^3b-153884051200a^4b+102507765120a^5b)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(-4331790400a^6b+1084021120a^7b-24653200a^8b+2774200a^9b-25740a^{10}b+1300a^{11}b)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(2926061420544b^2+616359260160ab^2+3873632532480a^2b^2-136391692800a^3b^2)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(403163393600a^4b^2-13652851520a^5b^2+8055718720a^6b^2-165048000a^7b^2+37165700a^8b^2)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(-328900a^9b^2+32890a^{10}b^2+455233155072b^3+2205838356480ab^3+136391692800a^2b^3)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(623645625600a^3b^3-9979681600a^4b^3+24972053120a^5b^3-400052800a^6b^3+208343200a^7b^3)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(-1644500a^8b^3+328900a^9b^3+340141995008b^4+153884051200ab^4+403163393600a^2b^4)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(9979681600a^3b^4+36049703200a^4b^4-261850400a^5b^4+562244200a^6b^4-3408600a^7b^4)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(1562275a^8b^4+28612691200b^5+102507765120ab^5+13652851520a^2b^5+24972053120a^3b^5)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(261850400a^4b^5+777964880a^5b^5-2080120a^6b^5+3863080a^7b^5+7810837952b^6)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(4331790400ab^6+8055718720a^2b^6+400052800a^3b^6+562244200a^4b^6+2080120a^5b^6)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(5200300a^6b^6+362197056b^7+1084021120ab^7+165048000a^2b^7+208343200a^3b^7)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(3408600a^4b^7+3863080a^5b^7+44691504b^8+24653200ab^8+37165700a^2b^8+1644500a^3b^8)}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(1562275a^4b^8+1063920b^9+2774200ab^9+328900a^2b^9+328900a^3b^9+61204b^{10}+25740ab^{10})}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{16384a(32890a^2b^{10}+572b^{11}+1300ab^{11}+13b^{12})}{\Big(\prod_{\mu=0}^{12}\{a-b-2\mu\}\Big)\Big(\prod_{\nu=1}^{13}\{a-b+2\nu\}\Big)}+$$

$$+\frac{8192(1961990553600a+3044235018240a^2+1977916981248a^3+723975622656a^4)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(168244950016a^5+26376979200a^6+2879374784a^7+221652288a^8+11991408a^9)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(446160a^{10}+10868a^{11}+156a^{12}+a^{13}+1961990553600b+10842988216320a^2b)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(2592851189760a^3b+2165934351360a^4b+260372403200a^5b+72362488640a^6b)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(4556672640a^7b+567206640a^8b+17846400a^9b+1055340a^{10}b+13000a^{11}b+325a^{12}b)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(-3044235018240b^2+10842988216320ab^2+6631413934080a^3b^2+541420588800a^4b^2)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(464469853120a^5b^2+24008216960a^6b^2+6791844800a^7b^2+188130800a^8b^2+23351900a^9b^2)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(+263120a^{10}b^2+14950a^{11}b^2+19779169812 48b^3-2592851189760ab^3+6631413934080a^2b^3)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(1110897902400a^4b^3+38354476160a^5b^3+31411074240a^6b^3+721427200a^7b^3)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(195037700a^8b^3+1973400a^9b^3+230230a^10b^3-723975622656b^4+2165934351360ab^4)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(-541420588800a^2b^4+1110897902400a^3b^4+65580555040a^5b^4+986221600a^6b^4)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(746483400a^7b^4+6249100a^8b^4+1562275a^9b^4+168244950016b^5-260372403200ab^5)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(464469853120a^2b^5-38354476160a^3b^5+65580555040a^4b^5+1433202680a^6b^5+7726160a^7b^5)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(5311735a^8b^5-26376979200b^6+72362488640ab^6-24008216960a^2b^6+31411074240a^3b^6)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(-986221600a^4b^6+1433202680a^5b^6+9657700a^7b^6+2879374784b^7-4556672640ab^7)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(6791844800a^2b^7-721427200a^3b^7+746483400a^4b^7-7726160a^5b^7+9657700a^6b^7)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(-221652288b^8+567206640ab^8-188130800a^2b^8+195037700a^3b^8-6249100a^4b^8)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(5311735a^5b^8+11991408b^9-17846400ab^9+23351900a^2b^9-1973400a^3b^9)}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(1562275a^4b^9-446160b^{10}+1055340ab^{10}-263120a^2b^{10}+230230a^3b^{10})}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}+$$

$$+\frac{8192(10868b^{11}-13000ab^{11}+14950a^2b^{11}-156b^{12}+325ab^{12}+b^{13})}{\Big(\prod_{\beta=0}^{13}\{a-b-2\beta\}\Big)\Big(\prod_{\gamma=1}^{12}\{a-b+2\gamma\}\Big)}\Bigg\}\Bigg] \tag{9}$$

C. DERIVATION OF SUMMATION FORMULA (8) :

Substituting $c=\frac{a+b+27}{2}$ and $z=\frac{1}{2}$ in equation (2), we get

$$(a-b)\ {}_2F_1\left[\begin{array}{ll} a,\ b & ; \\ \frac{a+b+27}{2} & ; \end{array}\ \frac{1}{2}\right]=a\ {}_2F_1\left[\begin{array}{ll} a+1,\ b & ; \\ \frac{a+b+27}{2} & ; \end{array}\ \frac{1}{2}\right]-b\ {}_2F_1\left[\begin{array}{ll} a,\ b+1 & ; \\ \frac{a+b+27}{2} & ; \end{array}\ \frac{1}{2}\right]$$

Now using Gauss second summation theorem, we get

$$L.H.S=a\ \frac{2^b\ \Gamma(\frac{a+b+27}{2})}{\Gamma(b)}\Bigg[\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a+1}{2})}\Bigg\{\frac{4096(316234143225-703416314160a+590546123298a^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(-264300628944a^3+72578259391a^4-13137458400a^5+1628301884a^6-140529312a^7)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(8439783a^8-345840a^9+9218a^{10}-144a^{11}+a^{12}-219830625000b+2368341306180ab)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(-806046993240a^2b+780221343260a^3b-112584499600a^4b+35861900520a^5b)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(-2569370160a^6b+358811640a^7b-12520200a^8b+817300a^9b-11000a^{10}b+300a^{11}b)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(1380437478090b^2-177787641120ab^2+1898646966530a^2b^2-204339507200a^3b^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(197154700500a^4b^2-11896225600a^5b^2+3808567700a^6b^2-118201600a^7b^2+16356450a^8b^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(-202400a^9b^2+12650a^10b^2+196444101000b^3+1376649886700ab^3-30674290400a^2b^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(390981756400a^3b^3-16713152400a^4b^3+15342044200a^5b^3-401212000a^6b^3+122148400a^7b^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(-1366200a^8b^3+177100a^9b^3+257166219575b^4+82836450400ab^4+308017819300a^2b^4)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(-1544183200a^3b^4+27248195450a^4b^4-482098400a^5b^4+412047300a^6b^4-3845600a^7b^4)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(1081575a^8b^4+22978396400b^5+92300279720ab^5+8838552240a^2b^5+22406440840a^3b^5)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(-20801200a^4b^5+684359480a^5b^5-4160240a^6b^5+3268760a^7b^5+8093571020b^6)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(3997024640ab^6+8366773940a^2b^6+303452800a^3b^6+577233300a^4b^6+5200300a^6b^6)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(406602000b^7+1279043800ab^7+172426400a^2b^7+244545200a^3b^7+2971600a^4b^7+4457400a^5b^7)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(59042775b^8+30866000ab^8+49094650a^2b^8+1922800a^3b^8+2042975a^4b^8+1524600b^9)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(4073300ab^9+455400a^2b^9+480700a^3b^9+98890b^{10}+40480ab^{10}+53130a^2b^{10})}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(1000b^{11}+2300ab^{11}+25b^{12})}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}\Bigg\}-$$

$$-\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a+2}{2})}\Bigg\{\frac{4096(316234143225+219830625000a+1380437478090a^2-196444101000a^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(257166219575a^4-22978396400a^5+8093571020a^6-406602000a^7+59042775a^8-1524600a^9)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(98890a^10-1000a^11+25a^12+703416314160b+2368341306180ab+177787641120a^2b)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(1376649886700a^3b-82836450400a^4b+92300279720a^5b-3997024640a^6b+1279043800a^7b)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(-30866000a^8b+4073300a^9b-40480a^{10}b+2300a^{11}b+590546123298b^2+806046993240ab^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(1898646966530a^2b^2+30674290400a^3b^2+308017819300a^4b^2-8838552240a^5b^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(8366773940a^6b^2-172426400a^7b^2+49094650a^8b^2-455400a^9b^2+53130a^{10}b^2)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(264300628944b^3+780221343260ab^3+204339507200a^2b^3+390981756400a^3b^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(1544183200a^4b^3+22406440840a^5b^3-303452800a^6b^3+244545200a^7b^3-1922800a^8b^3)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(480700a^9b^3+725782593391b^4+112584499600ab^4+197154700500a^2b^4+16713152400a^3b^4)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(27248195450a^4b^4+20801200a^5b^4+577233300a^6b^4-2971600a^7b^4+2042975a^8b^4)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(131374584 00b^5+35861900520ab^5+11896225600a^2b^5+15342044200a^3b^5+482098400a^4b^5)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(684359480a^5b^5+4457400a^7b^5+1628301884b^6+2569370160ab^6+3808567700a^2b^6)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(401212000a^3b^6+412047300a^4b^6+4160240a^5b^6+5200300a^6b^6+140529312b^7+358811640ab^7)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(118201600a^2b^7+122148400a^3b^7+3845600a^4b^7+3268760a^5b^7+8439783b^8+12520200ab^8)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(16356450a^2b^8+1366200a^3b^8+1081575a^4b^8+345840b^9+817300ab^9+202400a^2b^9)}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}+$$

$$+\frac{4096(+177100a^3b^9+9218b^{10}+11000ab^{10}+12650a^2b^{10}+144b^{11}+300ab^{11}+b^{12})}{\Big(\prod_{\zeta=1}^{12}\{a-b-(2\zeta-1)\}\Big)\Big(\prod_{\eta=1}^{13}\{a-b+(2\eta-1)\}\Big)}\Bigg\}\Bigg]-$$

$$-b\,\frac{2^{b+1}\,\Gamma(\frac{a+b+27}{2})}{\Gamma(b+1)}\Bigg[\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a}{2})}\Bigg\{\frac{4096(316234143225+703416314160a+590546123298a^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(264300628944a^3+72578259391a^4+13137458400a^5+1628301884a^6+140529312a^7)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(8439783a^8+345840a^9+9218a^{10}+144a^{11}+a^{12}+219830625000b+2368341306180ab)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(806046993240a^2b+780221343260a^3b+112584499600a^4b+35861900520a^5b)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(2569370160a^6b+358811640a^7b+12520200a^8b+817300a^9b+11000a^{10}b+300a^{11}b)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(1380437478090b^2+177787641120ab^2+1898646966530a^2b^2+204339507200a^3b^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(197154700500a^4b^2+11896225600a^5b^2+3808567700a^6b^2+118201600a^7b^2+16356450a^8b^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(202400a^9b^2+12650a^{10}b^2-196444101000b^3+1376649886700ab^3+30674290400a^2b^3)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(390981756400a^3b^3+16713152400a^4b^3+15342044200a^5b^3+401212000a^6b^3+122148400a^7b^3)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(1366200a^8b^3+177100a^9b^3+257166219575b^4-82836450400ab^4+308017819300a^2b^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(+1544183200a^3b^4+27248195450a^4b^4+482098400a^5b^4+412047300a^6b^4+3845600a^7b^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(1081575a^8b^4-22978396400b^5+92300279720ab^5-8838552240a^2b^5+22406440840a^3b^5)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(20801200a^4b^5+684359480a^5b^5+4160240a^6b^5+3268760a^7b^5+8093571020b^6)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(-3997024640ab^6+8366773940a^2b^6-303452800a^3b^6+577233300a^4b^6+5200300a^6b^6)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(-406602000b^7+1279043800ab^7-172426400a^2b^7+244545200a^3b^7-2971600a^4b^7)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(4457400a^5b^7+59042775b^8-30866000ab^8+49094650a^2b^8-1922800a^3b^8+2042975a^4b^8)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(-1524600b^9+4073300ab^9-455400a^2b^9+480700a^3b^9+98890b^{10}-40480ab^{10}+53130a^2b^{10})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(-1000b^{11}+2300ab^{11}+25b^{12})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}\Bigg\}-$$

$$-\frac{\Gamma(\frac{b+2}{2})}{\Gamma(\frac{a+1}{2})}\Bigg\{\frac{4096(316234143225-219830625000a+1380437478090a^2+196444101000a^3)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(257166219575a^4+22978396400a^5+8093571020a^6+406602000a^7+59042775a^8)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(1524600a^9+98890a^{10}+1000a^{11}+25a^{12}-703416314160b+2368341306180ab)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(-177787641120a^2b+1376649886700a^3b+82836450400a^4b+92300279720a^5b)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(3997024640a^6b+1279043800a^7b+30866000a^8b+4073300a^9b+40480a^{10}b+2300a^{11}b)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(590546123298b^2-806046993240ab^2+1898646966530a^2b^2-30674290400a^3b^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(308017819300a^4b^2+8838552240a^5b^2+8366773940a^6b^2+172426400a^7b^2+49094650a^8b^2)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(455400a^9b^2+53130a^10b^2-264300628944b^3+780221343260ab^3-204339507200a^2b^3)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(390981756400a^3b^3-1544183200a^4b^3+22406440840a^5b^3+303452800a^6b^3+244545200a^7b^3)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(1922800a^8b^3+480700a^9b^3+72578259391b^4-112584499600ab^4+197154700500a^2b^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(-16713152400a^3b^4+27248195450a^4b^4-20801200a^5b^4+577233300a^6b^4+2971600a^7b^4)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(2042975a^8b^4-13137458400b^5+35861900520ab^5-11896225600a^2b^5+15342044200a^3b^5)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(-482098400a^4b^5+684359480a^5b^5+4457400a^7b^5+1628301884b^6-2569370160ab^6)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(3808567700a^2b^6-401212000a^3b^6+412047300a^4b^6-4160240a^5b^6+5200300a^6b^6)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(-140529312b^7+358811640ab^7-118201600a^2b^7+122148400a^3b^7-3845600a^4b^7)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(3268760a^5b^7+8439783b^8-12520200ab^8+16356450a^2b^8-1366200a^3b^8+1081575a^4b^8)}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(-345840b^9+817300ab^9-202400a^2b^9+177100a^3b^9+9218b^{10}-11000ab^{10})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}+$$

$$+\frac{4096(12650a^2b^{10}-144b^{11}+300ab^{11}+b^{12})}{\Big(\prod_{\chi=1}^{13}\{a-b-(2\chi-1)\}\Big)\Big(\prod_{\sigma=1}^{12}\{a-b+(2\sigma-1)\}\Big)}\Bigg\}\Bigg]$$

On simplification we get the result (8).
Similarly we can prove the result (9).

REFERENCES

1. Arora, Asish, Singh, Rahul , Salahuddin. ; Development of a family of summation formulae of half argument using Gauss and Bailey theorems *Journal of Rajasthan Academy of Physical Sciences.*, 7(2008), 335-342.

2. Lavoie, J. L.; Some summation formulae for the series ${}_3F_2$, *Math. Comput.*, 49(1987), 269-274.

3. Lavoie, J. L., Grondin, F. and Rathie, A.K.; Generalizations of Watson's theorem on the sum of a ${}_3F_2$, *Indian J. Math.*, 34(1992), 23-32.

4. Lavoie, J. L., Grondin, F. and Rathie, A.K.; Generalizations of Whipple's theorem on the sum of a ${}_3F_2$, *J. Comput. Appl. Math.*, 72(1996), 293-300.

5. Prudnikov, A. P., Brychkov, Yu. A. and Marichev, O.I.; *Integrals and Series Vol. 3: More Special Functions.* Nauka, Moscow, 1986. Translated from the Russian by G.G. Gould, Gordon and Breach Science Publishers, New York, Philadelphia, London, Paris, Montreux, Tokyo, Melbourne, 1990.

6. Rainville, E. D.; The contiguous function relations for ${}_pF_q$ with applications to Bateman's $J_n^{u,v}$ and Rice's $H_n\ (\zeta, p, \nu)$, *Bull. Amer. Math. Soc.*, 51(1945), 714-723.

7. Salahuddin, Chaudhary, M.P ; Development of some summation formulae using Hypergeometric function, *Global journal of Science Frontier Research*, 10(2010),36-48.

8. Salahuddin, Chaudhary, M.P ; Certain summation formulae associated to Gauss second summation theorem, *Global journal of Science Frontier Research*, 10(2010),30-35.