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Creation of a Summation Formula Associated To Hypergeometric Function

By Salahuddin
P.D.M College of Engineering,Bahadurgarh ,Haryana,India

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Creation of a Summation Formula Associated To Hypergeometric Function

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I. INTRODUCTION

Generalized Gaussian Hypergeometric function of one variable :

$$ {}_AF_B\left[\begin{array}{c} a_1, a_2, \cdots, a_A \\ \\ b_1, b_2, \cdots, b_B \end{array} ; \; z \right] = \sum_{k=0}^{\infty} \frac{(a_1)_k (a_2)_k \cdots (a_A)_k z^k}{(b_1)_k (b_2)_k \cdots (b_B)_k k!} \tag{1} $$

or

$$ {}_AF_B\left[\begin{array}{c} (a_A) \\ \\ (b_B) \end{array} ; \; z \right] \equiv {}_AF_B\left[\begin{array}{c} (a_j)_{j=1}^{A} \\ \\ (b_j)_{j=1}^{B} \end{array} ; \; z \right] = \sum_{k=0}^{\infty} \frac{((a_A))_k z^k}{((b_B))_k k!} \tag{2} $$

where the parameters b1, b2, $\cdots$, bB are neither zero nor negative integers and A, B are non-negative integers.

Contiguous Relations :

[Andrews p.367(8), E. D. p.52(19), H.T. F. I p.103(38)]

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

[Abramowitz p.558(15.2.19)]

$$ (a-b)\,(1-z)\,{}_2F_1\left[\begin{array}{c} a,\ b \\ c \end{array} ; \; z \right] = (c-b)\,{}_2F_1\left[\begin{array}{c} a,\ b-1 \\ c \end{array} ; \; z \right] + (a-c)\,{}_2F_1\left[\begin{array}{c} a-1,\ b \\ c \end{array} ; \; z \right] \tag{4} $$

Recurrence relation :

$$ \Gamma(z+1) = z\,\Gamma(z) \tag{5} $$

Gauss second summation theorem [Prud.,p. 491(7.3.7.5)]

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

$$ = \frac{2^{(b-1)}\,\Gamma(\frac{b}{2})\,\Gamma(\frac{a+b+1}{2})}{\Gamma(b)\,\Gamma(\frac{a+1}{2})} \tag{7} $$

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

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A new summation formula [Ref.[2], p.337(10)]

$$ {}_2F_1\left[\begin{array}{ccc} a, & b & ; \\ \frac{a+b-1}{2} & & ; \end{array}\ \frac{1}{2}\right] = \frac{2^{(b-1)}\ \Gamma(\frac{a+b-1}{2})}{\Gamma(b)}\left[\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-1}{2})}\left\{\frac{(b+a-1)}{(a-1)}\right\}+\frac{2\ \Gamma(\frac{b+1}{2})}{\Gamma(\frac{a}{2})}\right] \quad (8) $$

II. Main Result of Summation Formula

For the result a ≠ b

For a < 1 and a > 26

$$ {}_2F_1\left[\begin{array}{ccc} a, & b & ; \\ \frac{a+b-26}{2} & & ; \end{array}\ \frac{1}{2}\right] = \frac{2^{(b-1)}\ \Gamma(\frac{a+b-26}{2})}{(a-b)\Gamma(b)}\left[\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a-25}{2})}\left\{\frac{(-51011754393600a+118357504819200a^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+\right.\right. $$

$$ +\frac{(-98966710517760a^3+50325530075136a^4-13499505727488a^5+3022190341632a^6)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+ $$

$$ +\frac{(-362148232320a^7+43098257088a^8-2514923424a^9+168298416a^{10}-4581720a^{11})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+ $$

$$ +\frac{(167076a^{12}-1638a^{13}+27a^{14}+51011754393600b-37245403791360ab)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+ $$

$$ +\frac{(-80940037570560a^2b+116415325569024a^3b-56842678044672a^4b+20500735269888a^5b)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+ $$

$$ +\frac{(-3465526377600a^6b+602603557632a^7b-45225891936a^8b+4379847264a^9b)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+ $$

$$ +\frac{(-146597880a^{10}b+8146944a^{11}b-96642a^{12}b+2898a^{13}b-811121010278402b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+ $$

$$ +\frac{(125436671557632ab^2-40136123400192a^2b^2-29139543552000a^3b^2+28970371269120a^4b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+ $$

$$ +\frac{(-8572247383680a^5b^2+2327580541440a^6b^2-241499986560a^7b^2+33641930160a^8b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+ $$

$$ +\frac{(-1435972200a^9b^2+115023480a^{10}b^2-1677780a^{11}b^2+77805a^{12}b^2+544700765306883^3)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+ $$

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$$+\frac{(-105803449073664ab^3+54798064349184a^2b^3-10427956377600a^3b^3-3542080886400a^4b^3)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(2603552336640a^5b^3-460166232960a^6b^3+98011751040a^7b^3-5699579400a^8b^3)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(650863200a^9b^3-12037740a^{10}b^3+807300a^{11}b^3-208012831703O4b^4+39585318651904ab^4)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-30275778276864a^2b^4+7412413123200a^3b^4-959907907200a^4b^4-167925885120a^5b^4)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(95582763360a^6b^4-9286930800a^7b^4+1598971500a^8b^4-39871650a^9b^4+3798795a^{10}b^4)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(5098344323072b^5-10935515816960ab^5+6776317860480a^2b^5-2954903965440a^3b^5)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(375539532480a^4b^5-35771520960a^5b^5-3129724080a^6b^5+1427207040a^7b^5-58641030a^8b^5)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(8351070a^9b^5-854046409216b^6+1652031172736ab^6-1430967960576a^2b^6)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(393494693760a^3b^6-114446656800a^4b^6+7316754480a^5b^6-539607600a^6b^6-18721080a^7b^6)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(7020405a^8b^6+1012407235840b^7-222412525312ab^7+131731224192a^2b^7-65902227840a^3b^7)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(8369506800a^4b^7-1772648640a^5b^7+45150840a^6b^7-2674440a^7b^7-8642334272b^8)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(16034040672ab^8-14476664592a^2b^8+3390870600a^3b^8-1141791300a^4b^8+54815670a^5b^8)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-8947575a^6b^8+5334288896b^9-1163928480ab^9+585996840a^2b^9-308880000a^3b^9)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

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$$+\frac{(25160850a^4b^9-6216210a^5b^9-23591568b^{10}+39528632ab^{10}-35902152a^2b^{10})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(5379660a^3b^{10}-1924065a^4b^{10}+728728b^{11}-1534624ab^{11}+520884a^2b^{11}-278460a^3b^{11})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-14924b^{12}+19474ab^{12}-17199a^2b^{12}+182b^{13}-350ab^{13}-b^{14})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}\Bigg\}+$$

$$+\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-26}{2})}\Bigg\{\frac{(-51011754393600a+81112101027840a^2-54470076530688a^3+20801283170304a^4)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-5098344323072a^5+854046409216a^6-101240723584a^7+8642334272a^8-533428896a^9)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(23591568a^{10}-728728a^{11}+14924a^{12}-182a^{13}+a^{14}+51011754393600b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(37245403791360ab-125436671557632a^2b+105803449073664a^3b-39585318651904a^4b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(10935515816960a^5b-1652031172736a^6b+222412525312a^7b-16034040672a^8b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(1163928480a^9b-39528632a^{10}b+1534624a^{11}b-19474a^{12}b+350a^{13}b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-1183575048192200b^2+80940037570560ab^2+40136123400192a^2b^2-54798064349184a^3b^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(30275778276864a^4b^2-6776317860480a^5b^2+1430967960576a^6b^2-131731224192a^7b^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(14476664592a^8b^2-585996840a^9b^2+35902152a^{10}b^2-520884a^{11}b^2+17199a^{12}b^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(98966710517760b^3-116415325569024ab^3+29139543552000a^2b^3+10427956377600a^3b^3)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

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$$+\frac{(-7412413123200a^4b^3+2954903965440a^5b^3-393494693760a^6b^3+65902227840a^7b^3)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-3390870600a^8b^3+308880000a^9b^3-5379660a^{10}b^3+278460a^{11}b^3-503255300751 36b^4)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(56842678044672ab^4-28970371269120a^2b^4+3542080886400a^3b^4+959907907200a^4b^4)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-375539532480a^5b^4+114446656800a^6b^4-8369506800a^7b^4+1141791300a^8b^4)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-25160850a^9b^4+1924065a^10b^4+134995057274 88b^5-20500735269888ab^5)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(8572247383680a^2b^5-2603552336640a^3b^5+167925885120a^4b^5+35771520960a^5b^5)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-7316754480a^6b^5+1772648640a^7b^5-54815670a^8b^5+6216210a^9b^5-30221903416 32b^6)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(3465526377600ab^6-2327580541440a^2b^6+460166232960a^3b^6-95582763360a^4b^6)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(3129724080a^5b^6+539607600a^6b^6-45150840a^7b^6+8947575a^8b^6+3621482323 20b^7)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-602603557632ab^7+241499986560a^2b^7-98011751040a^3b^7+9286930800a^4b^7)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-1427207040a^5b^7+18721080a^6b^7+2674440a^7b^7-430982570 88b^8+45225891936ab^8)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-33641930160a^2b^8+5699579400a^3b^8-1598971500a^4b^8+58641030a^5b^8-7020405a^6b^8)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(2514923424b^9-4379847264ab^9+1435972200a^2b^9-650863200a^3b^9+39871650a^4b^9)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

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$$+\frac{(-8351070a^5b^9-168298416b^{10}+146597880ab^{10}-115023480a^2b^{10}+12037740a^3b^{10})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-3798795a^4b^{10}+4581720b^{11}-8146944ab^{11}+1677780a^2b^{11}-807300a^3b^{11}-167076b^{12})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(96642ab^{12}-77805a^2b^{12}+1638b^{13}-2898ab^{13}-27b^{14})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}\Bigg\}\Bigg] \qquad (9)$$

III. Derivation of Summation Formula

Substituting $c=\frac{a+b-26}{2}$ and $z=\frac{1}{2}$ in equation (4), we get

$$(a-b)\,{}_2F_1\left[\begin{matrix}a,\ b\\ \frac{a+b-26}{2}\end{matrix};\ \frac{1}{2}\right]=(a-b-26)\,{}_2F_1\left[\begin{matrix}a,\ b-1\\ \frac{a+b-26}{2}\end{matrix};\ \frac{1}{2}\right]+(a-b+26)\,{}_2F_1\left[\begin{matrix}a-1,\ b\\ \frac{a+b-26}{2}\end{matrix};\ \frac{1}{2}\right]$$

Now involving (8), we get

$$L.H.S=\frac{2^{(b-1)}\,\Gamma(\frac{a+b-26}{2})}{\Gamma(b)}\Bigg[\frac{(a-b-26)}{(a-b+1)}\,\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a-25}{2})}\Bigg\{\frac{(-51011754393600+63421769318400a)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(16748406374400a^2-53211710103552a^3+31884367816704a^4-10247133065728a^5)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(2036983501696a^6-277446268736a^7+25686051872a^8-1711613904a^9+76461528a^{10})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-2409212a^{11}+44174a^{12}-493a^{13}+a^{14}+1321238554214 40b-214509763952640ab)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(69300067000320a^2b+39220418445312a^3b-3740917693593 6a^4b+13249436039424a^5b)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-2774297373120a^6b+374132468736a^7b-34906601808a^8b+2199314832a^9b)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-96653700a^{10}b+2674152a^{11}b-45981a^{12}b+324a^{13}b-1355821775585 28b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

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$$+\frac{(247470874140672ab^2-132765127372800a^2b^2+13141051223040a^3b^2+13507644309120a^4b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-6440276531520a^5b^2+1464334185600a^6b^2-200779225920a^7b^2+18441479160a^8b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-1106176500a^9b^2+45122220a^{10}b^2-1056510a^{11}b^2+14625a^{12}b^2+752713597009 92b^3)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-145545455517696ab^3+92773980349440a^2b^3-23307154291200a^3b^3+241895784000a^4b^3)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(1433140200960a^5b^3-381254852160a^6b^3+57692456640a^7b^3-4872055500a^8b^3)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(297983400a^9b^3-9176310a^10b^3+215280a^11b^3-25899627493376b^4+51605063198208ab^4)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-35381743413120a^2b^4+11188028404800a^3b^4-1456235726400a^4b^4-48159427680a^5b^4)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(57377502000a^6b^4-8314651800a^7b^4+844301250a^8b^4-34781175a^9b^4+1332045a^{10}b^4)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(595239073228 8b^5-12065729105664ab^5+8483867870400a^2b^5-2922691799040a^3b^5)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(514262155680a^4b^5-33843307680a^5b^5-1932676200a^6b^5+887599440a^7b^5-55986255a^8b^5)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(3749460a^9b^5-955287132800b^6+1924689738816ab^6-1398536380800a^2b^6)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(477591791040a^3b^6-93800725200a^4b^6+9176632920a^5b^6-243374040a^6b^6-17383860a^7b^6)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(4345965a^8b^6+1098830578 56b^7-224082713088ab^7+153166553280a^2b^7)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

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$$+\frac{(-56306053440a^3b^7+9910953000a^4b^7-1157560560a^5b^7+52151580a^6b^7-9175763168b^8)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(17856571824ab^8-13073565960a^2b^8+3943660500a^3b^8-833806350a^4b^8+63655605a^5b^8)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-4345965a^6b^8+557020464b^9-1116930672ab^9+665078700a^2b^9-246675000a^3b^9)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(29354325a^4b^9-3749460a^5b^9-24320296b^{10}+43083612ab^{10}-31068180a^2b^{10})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(6216210a^3b^{10}-1332045a^4b^{10}+743652b^{11}-1433016ab^{11}+586170a^2b^{11}-215280a^3b^{11})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-15106b^{12}+20943ab^{12}-14625a^2b^{12}+183b^{13}-324ab^{13}-b^{14})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}\Bigg\}+$$

$$+\frac{(a-b-26)(b-1)}{(a-b+1)}\,\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-26}{2})}\Bigg\{\frac{(51011754393600-28138356080640a-27724268961792a^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(32602475323392a^3-1444899748864 0a^4+3688567241216a^5-610937714816a^6)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(69100784896a^7-5451182880a^8+300176448a^9-11317592a^{10}+278512a^{11}-4030a^{12})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(26a^13-1163955142656 00b+114522988216320ab-15005106413568a^2b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-22245090729984a^3b+13643817721344a^4b-3756359681280a^5b+648405662976a^6b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-71817829632a^7b+5627524032a^8b-286125840a^9b+10316592a^{10}b-204984a^{11}b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(2574a^{12}b+1020109455360 00b^2-119270681763840ab^2+44340497510400a^2b^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

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$$+\frac{(-288101760000a^3b^2-4178311804800a^4b^2+1541357026560a^5b^2-266164456320a^6b^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(31589510400a^7b^2-2186379000a^8b^2+115486800a^9b^2-3011580a^{10}b^2+63180a^{11}b^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-483476130938888b^3+61214607532032ab^3-28068077798400a^2b^3+5225944742400a^3b^3)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(2694930240000a^4b^3-263679978240a^5b^3+62828640000a^6b^3-6397790400a^7b^3)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(519901200a^8b^3-17760600a^9b^3+592020a^{10}b^3+14223481350144b^4-18853937339904ab^4)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(9378156470400a^2b^4-2240652345600a^3b^4+226918036800a^4b^4+19781516160a^5b^4)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-6048126000a^6b^4+965282400a^7b^4-45612450a^8b^4+2466750a^9b^4-28539453916l6b^5)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(3737155541760ab^5-1983951601920a^2b^5+504233452800a^3b^5-68857407360a^4b^5)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(3713381280a^5b^5+427281120a^6b^5-42476400a^7b^5+4601610a^8b^5+3885252115l0b^6)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-535705585920ab^6+264770593920a^2b^6-75069792000a^3b^6+10115758800a^4b^6)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-797297760a^5b^6+18721080a^6b^6+2674440a^7b^6-40218882304b^7+49712345856ab^7)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-27579168000a^2b^7+6330888000a^3b^7-1062655200a^4b^7+63242640a^5b^7-2674440a^6b^7)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(2736575712b^8-3829505472ab^8+1613406600a^2b^8-481150800a^3b^8+44805150a^4b^8)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

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$$+\frac{(-4601610a^5b^8-156307008b^9+164152560ab^9-92835600a^2b^9+13813800a^3b^9)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-2466750a^4b^9+5027880b^{10}-7104240ab^{10}+1930500a^2b^{10}-592020a^3b^{10}-156208b^{11})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(109512ab^{11}-63180a^2b^{11}+1794b^{12}-2574ab^{12}-26b^{13})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}\Bigg\}\Bigg]+\frac{2^{(b-1)}\ \Gamma(\frac{a+b-26}{2})}{\Gamma(b)}\Bigg[\frac{(a-b+26)}{(a-b-1)}\times$$

$$\times\frac{\Gamma(\frac{b}{2})}{\Gamma(\frac{a-26}{2})}\Bigg\{\frac{(51011754393600-132123855421440a+135582177558528a^2-75271359700992a^3)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(25899627493376a^4-5952390732288a^5+955287132800a^6-109883057856a^7)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(9175763168a^8-557020464a^9+24320296a^{10}-743652a^{11}+15106a^{12}-183a^{13}+a^{14})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-634217693184000b+21450976395264ab-247470874140672a^2b+145545455517696a^3b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-51605063198208a^4b+12065729105664a^5b-1924689738816a^6b+224082713088a^7b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-17856571824a^8b+1116930672a^9b-43083612a^{10}b+1433016a^{11}b-20943a^{12}b+324a^{13}b)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-16748406374400b^2-69300067000320ab^2+132765127372800a^2b^2-92773980349440a^3b^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(35381743413120a^4b^2-8483867870400a^5b^2+1398536380800a^6b^2-153166553280a^7b^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(13073565960a^8b^2-665078700a^9b^2+31068180a^{10}b^2-586170a^{11}b^2+14625a^{12}b^2)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(532117101035520b^3-39220418445312ab^3-13141051223040a^2b^3+2330715429120a^3b^3)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

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$$+\frac{(-11188028404800a^4b^3+2922691799040a^5b^3-477591791040a^6b^3+56306053440a^7b^3)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-3943660500a^8b^3+246675000a^9b^3-6216210a^{10}b^3+215280a^{11}b^3-318843678167 04b^4)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(37409176935936ab^4-13507644309120a^2b^4-241895784000a^3b^4+1456235726400a^4b^4)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-514262155680a^5b^4+93800725200a^6b^4-9910953000a^7b^4+833806350a^8b^4-29354325a^9b^4)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(1332045a^{10}b^4+10247133065728b^5-13249436039424ab^5+6440276531520a^2b^5)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-1433140200960a^3b^5+48159427680a^4b^5+33843307680a^5b^5-9176632920a^6b^5)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(1157560560a^7b^5-63655605a^8b^5+3749460a^9b^5-2036983501696b^6+2774297373120ab^6)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-1464334185600a^2b^6+381254852160a^3b^6-57377502000a^4b^6+1932676200a^5b^6)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(243374040a^6b^6-52151580a^7b^6+4345965a^8b^6+2774462687 36b^7-374132468736ab^7)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(200779225920a^2b^7-57692456640a^3b^7+8314651800a^4b^7-887599440a^5b^7+17383860a^6b^7)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-256860518 72b^8+34906601808ab^8-18441479160a^2b^8+4872055500a^3b^8-844301250a^4b^8)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(55986255a^5b^8-4345965a^6b^8+1711613904b^9-2199314832ab^9+1106176500a^2b^9)}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(-297983400a^3b^9+34781175a^4b^9-3749460a^5b^9-76461528b^{10}+96653700ab^{10})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

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$$+\frac{(-45122220a^2b^{10}+9176310a^3b^{10}-1332045a^4b^{10}+2409212b^{11}-2674152ab^{11})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}+$$

$$+\frac{(1056510a^2b^{11}-215280a^3b^{11}-44174b^{12}+45981ab^{12}-14625a^2b^{12}+493b^{13}-324ab^{13}-b^{14})}{\prod_{\Upsilon=1}^{13}\{a-2\Upsilon\}}\Bigg\}+$$

$$+\frac{(a-b+26)}{(a-b-1)}\frac{\Gamma(\frac{b+1}{2})}{\Gamma(\frac{a-25}{2})}\Bigg\{\frac{(-51011754393600+116395514265600a-102010945536000a^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}$$

$$+\frac{(48347613093888a^3-14223481350144a^4+2853945391616a^5-388525211520a^6)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(40218882304a^7-2736575712a^8+156307008a^9-5027880a^{10}+156208a^{11}-1794a^{12})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(26a^{13}+28138356080640b-1145229882163 20ab+119270681763840a^2b)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-61214607532032a^3b+18853937339904a^4b-3737155541760a^5b+535705585920a^6b)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-49712345856a^7b+3829505472a^8b-164152560a^9b+7104240a^{10}b-109512a^{11}b)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(2574a^{12}b+27724268961792b^2+15005106413568ab^2-44340497510400a^2b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(28068077798400a^3b^2-9378156470400a^4b^2+1983951601920a^5b^2-264770593920a^6b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(27579168000a^7b^2-1613406600a^8b^2+92835600a^9b^2-1930500a^{10}b^2+63180a^{11}b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(27579168000a^7b^2-1613406600a^8b^2+92835600a^9b^2-1930500a^{10}b^2+63180a^{11}b^2)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

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$$+\frac{(-326024753233392b^3+22245090729984ab^3+288101760000a^2b^3-5225944742400a^3b^3)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(2240652345600a^4b^3-504233452800a^5b^3+75069792000a^6b^3-6330888000a^7b^3)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(481150800a^8b^3-13813800a^9b^3+592020a^{10}b^3+14448997488640b^4-13643817721344ab^4)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(4178311804800a^2b^4-269493024000a^3b^4-226918036800a^4b^4+68857407360a^5b^4)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-10115758800a^6b^4+1062655200a^7b^4-44805150a^8b^4+2466750a^9b^4-36885672241216b^5)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(3756359681280ab^5-1541357026560a^2b^5+263679978240a^3b^5-19781516160a^4b^5)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-3713381280a^5b^5+797297760a^6b^5-63242640a^7b^5+4601610a^8b^5+6109377148 16b^6)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-648405662976ab^6+266164456320a^2b^6-62828640000a^3b^6+6048126000a^4b^6)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-427281120a^5b^6-18721080a^6b^6+2674440a^7b^6-69100784896b^7+71817829632ab^7)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-31589510400a^2b^7+6397790400a^3b^7-965282400a^4b^7+42476400a^5b^7-2674440a^6b^7)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(54511828 80b^8-5627524032ab^8+2186379000a^2b^8-519901200a^3b^8+45612450a^4b^8)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(-4601610a^5b^8-300176448b^9+286125840ab^9-115486800a^2b^9+17760600a^3b^9)}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

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$$+\frac{(-2466750a^4b^9+11317592b^{10}-10316592ab^{10}+3011580a^2b^{10}-592020a^3b^{10}-278512b^{11})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}+$$

$$+\frac{(204984ab^{1}1-63180a^2b^{11}+4030b^{12}-2574ab^{12}-26b^{13})}{\prod_{\Omega=1}^{13}\{a-(2\Omega-1)\}}\Bigg\}\Bigg]$$

On simplification, we get the result.

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