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CREATION OF A SUMMATION FORMULA AMASSED WITH HYPERGEOMETRIC FUNCTION

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ABSTRACT

The main aim of this paper is to establish a summation formula connected to recurrence relation and Hypergeometric function.

Key words: *Contiguous relation, Recurrence relation.*

AMS Subject Classifications: *33C05, 33C20, 33D15, 33D50, 33D60.*

1. INTRODUCTION:

Generalized Gaussian Hypergeometric function of one variable

$${}_AF_B(a_1,a_2,\ldots,a_A;b_1,b_2,\ldots b_B;z) = \sum_{k=0}^{\infty} \frac{(a_1)_k (a_2)_k \ldots\ldots (a_A)_k \, z^k}{(b_1)_k (b_2)_k \ldots\ldots (b_B)_k \, k!} \tag{1}$$

or

$${}_AF_B((a_A);(b_B);z) \equiv {}_AF_B((a_j)^A_{j=1};(bj)^B_{j=1}; z) = \sum_{k=0}^{\infty} \frac{((a_A))_k \, z^k}{((b_B))_k \, k!} \tag{2}$$

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

Contiguous Relation [Abramowitz p.558 (15.2.19)]

$$(a-b)(1-z)\,{}_2F_1(a, b ; c; z) = (c-b)\,{}_2F_1(a,b-1; c; z) + (a-c)\,{}_2F_1(a-1,b; c; z) \tag{3}$$

A New Summation Formula [Asish et.al. p.337 (10)]

$${}_2F_1\left(a, b ; \frac{a+b-1}{2}; \frac{1}{2}\right) = 2^{b-1} \frac{\Gamma\left(\frac{\mathbf{a+b-1}}{\mathbf{2}}\right)}{\Gamma(b)} \left[\frac{\Gamma\left(\frac{\mathbf{b}}{\mathbf{2}}\right)}{\Gamma\left(\frac{\mathbf{a-1}}{\mathbf{2}}\right)} \left\{\frac{b+a-1}{a-1}\right\} + 2\,\frac{\Gamma\left(\frac{\mathbf{b+1}}{\mathbf{2}}\right)}{\Gamma\left(\frac{\mathbf{a}}{\mathbf{2}}\right)}\right] \tag{4}$$

Recurrence relation

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

2. MAIN SUMMATION FORMULAE:

For the formula, $a \neq b$

$${}_2F_1\left(a, b ; \frac{\mathbf{a+b-34}}{\mathbf{2}}; \frac{\mathbf{1}}{\mathbf{2}}\right) = 2^{b-1} \frac{\Gamma\left(\frac{\mathbf{a+b-34}}{\mathbf{2}}\right)}{(a-b)\Gamma(\mathbf{b})} \left[\frac{\Gamma\left(\frac{\mathbf{b+1}}{\mathbf{2}}\right)}{\Gamma\left(\frac{\mathbf{a-33}}{\mathbf{2}}\right)} \left\{\frac{-46620662575398912000\ \ a}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}\right.\right.$$

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$$+\frac{11382302556731473920\ a^2-10500235328307068928\ a^3+5861902784314893926\ a^4}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-1862907725294665728\ a^5+4784626383903457280\ a^6-740780649932144640\ a^7+107234294441852928\ a^8}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-9156271557480960\ a^9+813537684960000\ a^{10}-39907156692480\ a^{11}+2244378628352\ a^{12}-62207221440\ a^{13}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{2190723360\ a^{14}-31293600\ a^{15}+645456\ a^{16}-3570\ a^{17}+35a^{18}+46620662575398912000\ b}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-33645916783116288000\ ab-84561518714872135680\ a^2b+129763659102988271616\ a^3b}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-73613009092746805248\ a^4b+29479498835228753920\ a^5b-6343983065876807680\ a^6b}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{1279238137476841472\ a^7b-138449609215909376\ a^8b+16531351457195520\ a^9b-979155248924160\ a^{10}b}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{73863960977408\ a^{11}b-2401688227904\ a^{12}b+116468632000\ a^{13}b-1921106080\ a^{14}b}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{58461504\ a^{15}b-373422\ a^{16}b+6510\ a^{17}b-80177108784198451200\ b^2+129873603092482621440\ ab^2}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-42457289743367405568\ a^2b^2-37106107946844291072\ a^3b^2+39812044366013595648\ a^4b^2}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-14692380556579389440\ a^5b^2+4471031007977504768\ a^6b^2-657931339898128384\ a^7b^2}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{107386185329226496\ a^8b^2-7970363246461440\ a^9b^2+798970574814720\ a^{10}b^2-31206961561216\ a^{11}b^2}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{2018632501984\ a^{12}b^2-39045080480\ a^{13}b^2+1638718400\ a^{14}b^2-12144528\ a^{15}b^2+318087\ a^{16}b^2}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{59690268905460203520\ b^3-11998438102445064192\ ab^3+6924244941192010137\ a^2b^3}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-13678372958612226048\ a^3b^3-5954608749608386560\ a^4b^3+4766699089062428672\ a^5b^3}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-1169306515793647616\ a^6b^3+281375471713921024\ a^7b^3-27927511645411840\ a^8b^3}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{3775155672668160\ a^9b^3-183123351438720\ a^{10}b^3+15627545078656\ a^{11}b^3-361661886880\ a^{12}b^3}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{20220441920\ a^{13}b^3-175765040\ a^{14}b^3+6399888\ a^{15}b^3-25941016178319163392\ b^4}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}+$$

$$+\frac{52656760051942686720\ ab^4-42238854889841033216\ a^2b^4+12396931060360232960\ a^3b^4}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}+$$

$$+\frac{-1683270695069286400\ a^4b^4-417333234097511424\ a^5b^4+260597154107885056\ a^6b^4}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-422319931967436800\ a^7b^4+82743645220544000\ a^8b^4-5299655064950400\ a^9b^4+604020072532800\ a^{10}b^4}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-1724037328160\ a^{11}b^4+126665504000\ a^{12}b^4-1313726680\ a^{13}b^4+63882940\ a^{14}b^4}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{7448984828674965504\ b^5-16647465925428510720\ ab^5+11923071789675397120\ a^2b^5}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-5492919328384122880\ a^3b^5+930883783219174400\ a^4b^5-93608054444850176\ a^5b^5}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-13876520995814400\ a^6b^5+6982864096665600\ a^7b^5-718959448025280\ a^8b^5+117289391123520\ a^9b^5}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-4377496384800\ a^{10}b^5+426725812800\ a^{11}b^5-5430355560\ a^{12}b^5+346618440\ a^{13}b^5}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-1511475811264036864\ b^6+3186002273215856640\ ab^6-2901591504026435584\ a^2b^6}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{1027598518077429760\ a^3b^6-317158607326077440\ a^4b^6+32433959288192000\ a^5b^6}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-2537136178891776\ a^6b^6-223040891969280\ a^7b^6+92731850719200\ a^8b^6-5497912173600\ a^9b^6}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{760168221120\ a^{10}b^6-12555290160\ a^{11}b^6+1059111900\ a^{12}b^6+225747898745241600\ b^7}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-520952231893696512\ ab^7+378170753757513728\ a^2b^7-199793890577684480\ a^3b^7}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{39190434317224960\ a^4b^7-8830481379241984\ a^5b^7+538999101349632\ a^6b^7-33968933349120\ a^7b^7}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-1635980781600\ a^8b^7+573166440000\ a^9b^7-14902327440\ a^{10}b^7+1771605360\ a^{11}b^7}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}+$$

$$+\frac{-25468769585086464\ b^8+53318165593972224\ ab^8-50869652054546688\ a^2b^8+17551633226856960\ a^3b^8}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-6253683884448000\ a^4b^8+693774521297088\ a^5b^8-120593481335712\ a^6b^8+4052251130400\ a^7b^8}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-211252773600\ a^8b^8-4298748300\ a^9b^8+1289624490\ a^{10}b^8+2205749914587648\ b^9}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-5125547116952064\ ab^9+3542064723141120\ a^2b^9-1977099035197440\ a^3b^9+354678965551680\ a^4b^9}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-92742822287808\ a^5b^9+5461229521440\ a^6b^9-761136552000\ a^7b^9+10849221900\ a^8b^9-477638700\ a^9b^9}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-147948773077248\ b^{10}+299653989803520\ ab^{10}-290996817515008\ a^2b^{10}+89628868658560\ a^3b^{10}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-33949112083040\ a^4b^{10}+3067376348960\ a^5b^{10}-621571591872\ a^6b^{10}+15130170000\ a^7b^{10}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-1739969550\ a^8b^{10}+7705944829440\ b^{11}-17755304257536\ ab^{11}+11077802884736\ a^2b^{11}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-6337901386880\ a^3b^{11}+903735941920\ a^4b^{11}-252488853568\ a^5b^{11}+9104511024\ a^6b^{11}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-1485507600\ a^7b^{11}-310606256896\ b^{12}+591206371392\ ab^{12}-574040413856\ a^2b^{12}+141940591520\ a^3b^{12}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{-55399926400\ a^4\ b^{12}+2992900456\ a^5b^{12}-650872404\ a^6b^{12}+9588825792\ b^{13}-21572830272\ ab^{13}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{11170825120\ a^2b^{13}-6426038080\ a^3\ b^{13}+553497560\ a^4b^{13}-160043576\ a^5b^{13}-222345312\ b^{14}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{377930400\ ab^{14}-360427200\ a^2b^{14}+55606320\ a^3b^{14}-21912660\ a^4b^{14}+3745440\ b^{15}-8039232\ ab^{15}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}$$

$$+\frac{(2770320\ a^2b^{15}-1570800\ a^3b^{15}-43248\ b^{16}+56814\ ab^{16}-51765\ a^2b^{16}+306\ b^{17}-594\ ab^{17}-b^{18}}{\prod_{\zeta=1}^{17}\{a-(2\zeta-1)\}}\Bigg\}$$

$$+\frac{\Gamma(\frac{\mathbf{b}}{\mathbf{2}})}{\Gamma(\frac{\mathbf{a-34}}{\mathbf{2}})}\Big\{\frac{-466206625753989120000\ a+80177108784198451200\ a^2-5969026890546020352 0\ a^3}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{25941016178319163392\ a^4-7448984828674965504\ a^5+1511475811264036864\ a^6-225747898745241600\ a^7}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{25468769585086464\ a^8-2205749914587648\ a^9+147948773077248\ a^{10}-7705944829440\ a^{11}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{310606256896\ a^{12}-9588825792\ a^{13}+222345312\ a^{14}-3745440\ a^{15}+43248\ a^{16}-306\ a^{17}+a^{18}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{466206625753989120000\ b+33645916783116288000\ ab-129873603092482621440\ a^2\ b}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{11998438102445064192 0\ a^3b-52656760051942686720\ a^4\ b+16647465925428510720\ a^5b}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-3186002273215856640\ a^6b+520952231893696512\ a^7b-53318165593972224\ a^8\ b}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{5125547116952064\ a^9b-299653989803520\ a^{10}b+17755304257536\ a^{11}b-591206371392\ a^{12}b}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{21572830272\ a^{13}b-377930400\ a^{14}b+8039232\ a^{15}b-56814\ a^{16}b+594a^{17}b-113823025567314739200\ b^2}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{845615187148721356 80\ ab^2+42457289743367405568\ a^2b^2-69242449411920101376\ a^3b^2}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{42238854889841033216\ a^4b^2-11923071789675397120\ a^5b^2+2901591504026435584\ a^6b^2}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-378170753757513728\ a^7b^2+50869652054546688\ a^8b^2-3542064723141120\ a^9b^2+290996817515008\ a^{10}b^2}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-11077802884736\ a^{11}b^2+574040413856\ a^{12}\ b^2-11170825120\ a^{13}b^2+360427200\ a^{14}b^2-2770320\ a^{15}b^2}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{51765\ a^{16}b^2+105002353283070689280\ b^3-129763659102988271616\ ab^3+37106107946844291072\ a^2b^3}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{13678372958612226048\ a^3\ b^3-12396931060360232960\ a^4b^3+5492919328384122880\ a^5b^3}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-1027598518077429760\ a^6b^3+199793890577684480\ a^7\ b^3-17551633226856960\ a^8b^3}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{1977099035197440\ a^9b^3-89628868658560\ a^{10}b^3+6337901386880\ a^{11}b^3-141940591520\ a^{12}b^3}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{6426038080\ a^{13}b^3-55606320\ a^{14}b^3+1570800\ a^{15}b^3-58619027843148939264\ b^4}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{73613009092746805248\ ab^4-39812044366013595648\ a^2b^4+5954608749608386560\ a^3b^4}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{1683270695069286400\ a^4b^4-930883783219174400\ a^5b^4+317158607326077440\ a^6b^4}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-39190434317224960\ a^7b^4+6253683884448000\ a^8b^4-354678965551680\ a^9b^4+33949112083040\ a^{10}b^4}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-903735941920\ a^{11}b^4+55399926400\ a^{12}b^4-553497560\ a^{13}b^4+21912660\ a^{14}b^4}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{18629077252946657280\ b^5-29479498835228753920\ ab^5+14692380556579389440\ a^2b^5}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-4766699089062428672\ a^3b^5+417333234097511424\ a^4b^5+93608054444850176\ a^5b^5}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-324339592881920000\ a^6b^5+8830481379241984\ a^7b^5-693774521297088\ a^8b^5+92742822287808\ a^9b^5}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-30673763489600\ a^{10}b^5+2524888535680\ a^{11}b^5-299290045600\ a^{12}b^5+16004357600\ a^{13}b^5}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-4784626383903457280\ b^6+6343983065876807680\ ab^6-4471031007977504768\ a^2b^6}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{1169306515793647616\ a^3b^6-260597154107885056\ a^4b^6+13876520995814400\ a^5b^6}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{25371361788891776\ a^6b^6-538999101349632a^7b^6+1205934813357120\ a^8b^6-54612295214400\ a^9b^6}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{6215715918720\ a^{10}b^6-91045110240\ a^{11}b^6+6508724040\ a^{12}b^6+740780649932144640\ b^7}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-1279238137476841472\ ab^7+6579313398981283840\ a^2b^7-2813754717139210240\ a^3b^7}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{422319931967436800\ a^4b^7-69828640966656000\ a^5b^7+2230408919692800\ a^6b^7+339689333491200\ a^7b^7}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-40522511304000\ a^8b^7+761136552000\ a^9b^7-151301700000\ a^{10}b^7+14855076000\ a^{11}b^7}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-1072342944418529280\ b^8+1384496092159093760\ ab^8-1073861853292264960\ a^2b^8+79275116454118400\ a^3b^8}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-82743645220544000\ a^4b^8+7189594480252800\ a^5b^8-927318507192000\ a^6b^8+16359807816000\ a^7b^8}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{2112527736000\ a^8b^8-108492219000\ a^9b^8+17399695500\ a^{10}b^8+91562715574809600\ b^9}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-165313514571955200\ ab^9+79703632464614400\ a^2b^9-37751556726681600\ a^3b^9+5299655064950400\ a^4b^9}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-1172893911235200\ a^5b^9+54979121736000\ a^6b^9-5731664400000\ a^7b^9+42987483000\ a^8b^9}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{4776387000\ a^9b^9-8135376849600000\ b^{10}+9791552489241600\ ab^{10}-7989705748147200\ a^2b^{10}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{183123351438720\ a^3b^{10}-60402007253280\ a^4b^{10}+4377496384800\ a^5b^{10}-760168221120\ a^6b^{10}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{14902327440\ a^7b^{10}-1289624490\ a^8b^{10}+39907156692480\ b^{11}-73863960977408\ ab^{11}+31206961561216\ a^2b^{11}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-15627545078656\ a^3b^{11}+1724037328160\ a^4b^{11}-426725812800\ a^5b^{11}+12555290160\ a^6b^{11}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-1771605360\ a^7b^{11}-2244378628352\ b^{12}+2401688227904\ ab^{12}-2018632501984\ a^2b^{12}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{361661886880\ a^{12}b^{12}-126665504000\ a^4b^{12}+5430355560\ a^5b^{12}-1059111900\ a^6b^{12}+62207221440\ b^{13}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-116468632000\ ab^{13}+39045080480\ a^2b^{13}-20220441920\ a^3b^{13}+1313726680\ a^4b^{13}-346618440\ a^5b^{13}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-2190723360\ b^{14}+1921106080\ ab^{14}-1638718400\ a^2b^{14}+175765040\ a^3b^{14}-63882940\ a^4b^{14}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{31293600\ b^{15}-58461504\ ab^{15}+12144528\ a^2b^{15}-6399888\ a^3b^{15}-645456\ b^{16}+373422\ ab^{16}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}$$

$$+\frac{-318087\ a^2b^{16}+3570\ b^{17}-6510\ ab^{17}-35\ b^{18}}{\prod_{\sigma=1}^{17}\{a-2\sigma\}}\Bigg\}\Bigg] \qquad (6)$$

1. DERIVATION OF THE SUMMATION FORMULA:

Substituting $c=\frac{a+b-34}{2}$ and $z=\frac{1}{2}$ in equation (3), we get

$(a-b)\ {}_2F_1(a, b; \frac{a+b-34}{2}; \frac{\mathbf{1}}{\mathbf{2}}) = (a-b-34)\ {}_2F_1(a, b-1; \frac{a+b-34}{2}; \frac{\mathbf{1}}{\mathbf{2}}) + (a-b+34)\ {}_2F_1(a-1, b; \frac{a+b-34}{2}; \frac{\mathbf{1}}{\mathbf{2}})$

Now using the same parallel method of Ref [4], the summation formula is derived.

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