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Formation of a Summation Formula Enmeshed with Hypergeometric Function

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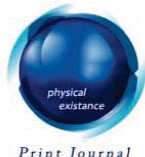
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Formation of a Summation Formula Enmeshed with Hypergeometric Function

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Abstract - The main aim of the present paper is to form a summation formula attached with contiguous relation and recurrence relation.

Keywords : Gaussian Hypergeometric function , Contiguous function, Recurrence relation, Bailey summation theorem and Legendre duplication formula.

1. INTRODUCTION

Generalized Gaussian hypergeometric function of one variable is defined by

$${}_A F_B \left[\begin{matrix} a_1, a_2, \dots, a_A ; \\ b_1, b_2, \dots, b_B ; \end{matrix} z \right] = \sum_{k=0}^{\infty} \frac{(a_1)_k (a_2)_k \dots (a_A)_k z^k}{(b_1)_k (b_2)_k \dots (b_B)_k k!}$$

or

$${}_A F_B \left[\begin{matrix} (a_A) ; \\ (b_B) ; \end{matrix} z \right] \equiv {}_A F_B \left[\begin{matrix} (a_j)_{j=1}^A ; \\ (b_j)_{j=1}^B ; \end{matrix} z \right] = \sum_{k=0}^{\infty} \frac{((a_A))_k z^k}{((b_B))_k k!} \quad (1)$$

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

Contiguous Relation[E. D. p.51(10), Andrews p.363(9.16)] is defined as follows

$$(a-b) {}_2 F_1 \left[\begin{matrix} a, b ; \\ c ; \end{matrix} z \right] = a {}_2 F_1 \left[\begin{matrix} a+1, b ; \\ c ; \end{matrix} z \right] - b {}_2 F_1 \left[\begin{matrix} a, b+1 ; \\ c ; \end{matrix} z \right] \quad (2)$$

Recurrence relation of gamma function is defined as follows

$$\Gamma(z+1) = z \Gamma(z) \quad (3)$$

Legendre duplication formula[Bells & Wong p.26(2.3.1)] is defined as follows

$$\sqrt{\pi} \Gamma(2z) = 2^{(2z-1)} \Gamma(z) \Gamma\left(z + \frac{1}{2}\right) \quad (4)$$

$$\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi} = \frac{2^{(b-1)} \Gamma\left(\frac{b}{2}\right) \Gamma\left(\frac{b+1}{2}\right)}{\Gamma(b)} \quad (5)$$

$$= \frac{2^{(a-1)} \Gamma\left(\frac{a}{2}\right) \Gamma\left(\frac{a+1}{2}\right)}{\Gamma(a)} \quad (6)$$

Bailey summation theorem [Prud, p.491(7.3.7.8)] is defined as follows

$${}_2F_1 \left[\begin{matrix} a, 1-a \\ c \end{matrix} ; \frac{1}{2} \right] = \frac{\Gamma\left(\frac{c}{2}\right) \Gamma\left(\frac{c+1}{2}\right)}{\Gamma\left(\frac{c+a}{2}\right) \Gamma\left(\frac{c+1-a}{2}\right)} = \frac{\sqrt{\pi} \Gamma(c)}{2^{c-1} \Gamma\left(\frac{c+a}{2}\right) \Gamma\left(\frac{c+1-a}{2}\right)} \quad (7)$$

II. MAIN RESULT OF SUMMATION FORMULA

$$\begin{aligned} & {}_2F_1 \left[\begin{matrix} a, & -a-48 \\ c \end{matrix} ; \frac{1}{2} \right] \\ &= \frac{\sqrt{\pi} \Gamma(c)}{2^{c+48}} \left[\frac{-3638347904750543085030062414561280000a}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \right. \\ & \quad + \frac{4230534459144635193233439012777984000a^2}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \\ & \quad + \frac{-1773530111269024379361184888978329600a^3}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \\ & \quad + \frac{-26072127788223783027931526767525632a^5 - 140082855115327355120120725082688a^6}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \\ & \quad + \frac{113210267032593419892743400611520a^7 - 1591308493265001080090252839184a^8}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \\ & \quad + \frac{-249488180140450905945277350672a^9 + 1896611354738752958221477012a^{10}}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \\ & \quad + \frac{340576268631980322449458500a^{11} + 2232393636721350709468081a^{12}}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \\ & \quad + \frac{-221961189928545392626392a^{13} - 4488938418788950118258a^{14}}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \\ & \quad + \frac{26237742565110055980a^{15} + 1726308193141046911a^{16} + 16724033867495328a^{17}}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \\ & \quad + \frac{-67838656895768a^{18} - 2424088437540a^{19} - 16239228929a^{20} - 12952632a^{21} + 295702a^{22}}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \\ & \quad + \frac{1140a^{23} + a^{24} + 3638347904750568937046801299537920000c}{\Gamma\left(\frac{c-a+1}{2}\right) \Gamma\left(\frac{c+a+48}{2}\right)} + \end{aligned}$$

$$\begin{aligned}
& + \frac{-11023860306689859165632917200175104000ac}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{8296047725075578715435877350611353600a^2c}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-2589060527415141315999913883524792320a^3c}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{366873883396175498327904190658199552a^4c - 17957990686264683551051799087968256a^5c}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-783414259355080511741474195684352a^6c + 84340873453502002421398843682048a^7c}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{973370298518103355293671126656a^8c - 160687148751021926409412982272a^9c}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-2248983658767185268213909888a^{10}c + 149172577626311143061653392a^{11}c}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{3615991694923403891801160a^{12}c - 40237584058803766916008a^{13}c}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-2145579120612795343784a^{14}c - 15847495431380520424a^{15}c + 294522342618394704a^{16}c}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{5916283797667056a^{17}c + 27173155233840a^{18}c - 187374214720a^{19}c - 2438354072a^{20}c}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-8088520a^{21}c - 1416a^{22}c + 24a^{23}c + 6793325847545320511366130680463360000c^2}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-12135827068916077894200206118617088000ac^2}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{6753675210879510270039714594306785280a^2c^2}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-1624869911805656070962191215597797376a^3c^2}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{171251591774737199593026229784064000a^4c^2 - 4093063242641347774786447363015680a^5c^2}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-511149924510502042072739692658944a^6c^2 + 22504067285994043924692302863232a^7c^2}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{913186425471360033494807245312a^8c^2 - 33804718262755533682100484480a^9c^2}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-1295637035432751803115296208a^{10}c^2 + 15890879633892055504532184a^{11}c^2}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{1022450363916086376744200a^{12}c^2 + 5608077520737975363080a^{13}c^2}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-278653737771626178104a^{14}c^2 - 4752455855653094160a^{15}c^2 - 5301794887227696a^{16}c^2}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{495348526392720a^{17}c^2 + 4527490455488a^{18}c^2 + 8270782520a^{19}c^2 - 69085016a^{20}c^2}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-326040a^{21}c^2 - 312a^{22}c^2 + 5613309455109683097975789723844608000c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-7268957877902293679747953623910318080ac^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{3148476881911767042344731733158526976a^2c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-591776472395510749153521515998937088a^3c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{45128923170400422228420079851380736a^4c^3 + 5555930291075194182761162530816a^5c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-150716557255326505370710216430080a^6c^3 + 2217081280693047664145316025088a^7c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{254900430630476339868277406976a^8c^3 - 1908319886666337016042402944a^9c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-255978165939209274666102816a^{10}c^3 - 1370080885460819936032720a^{11}c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{113902943230614008414944a^{12}c^3 + 1870509542899797944144a^{13}c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-7980655855696546880a^{14}c^3 - 425296980132412960a^{15}c^3 - 3111050730435648a^{16}c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{7889860890912a^{17}c^3 + 200089649760a^{18}c^3 + 804243440a^{19}c^3 + 352352a^{20}c^3 - 2288a^{21}c^3}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{2768586081553372140200792041508044800c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-2788045206948865839414630121447882752ac^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{962315653870080299754170370182283264a^2c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-141439234805306232175165147182489600a^3c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{7350569555757964653087742802558976a^4c^4 + 199068791705835251665671359802880a^5c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-25294347834251193603125177586944a^6c^4 - 147437993181774554303313826560a^7c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{36251936778359362132532742528a^8c^4 + 346029886905457750751639520a^9c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-24523514138602855095025488a^{10}c^4 - 447590500623950105662240a^{11}c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{4712185069329296679120a^{12}c^4 + 177404400410212015040a^{13}c^4 + 932298241605633760a^{14}c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-14323139972581440a^{15}c^4 - 193197305325024a^{16}c^4 - 553302990240a^{17}c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{2501298800a^{18}c^4 + 15215200a^{19}c^4 + 16016a^{20}c^4}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{923636481234908158042872857449463808c^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-747023445605858669273498410297589760ac^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{207668786206542828581701432891146240a^2c^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-23663020067855212035887457634222080a^3c^5 + 732904567621987230351419111325696a^4c^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{49903353805450335424368547782656a^5c^5 - 2578893746999530831934304224256a^6c^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-66577688249629584056310230016a^7c^5 + 2874347583304554423474949632a^8c^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{74463995548879100021824512a^9c^5 - 1062528271193599593294912a^{10}c^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-42807675912180201294272a^{11}c^5 - 124023155193475329792a^{12}c^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{7667675875623731968a^{13}c^5 + 86927587193935488a^{14}c^5 + 5208901746048a^{15}c^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-4594408955136a^{16}c^5 - 22868541696a^{17}c^5 - 15951936a^{18}c^5 + 64064a^{19}c^5}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{223330745897982709518529548993429504c^6 - 147472358833668973831737490003722240ac^6}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{33122202957018388352610598824574976a^2c^6 - 2871630447882289896332967060062208a^3c^6}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{34441427528122369258470645260288a^4c^6 + 6831394798548698327794234414080a^5c^6}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-150155381817771045217714537472a^6c^6 - 8692060148779265084777793024a^7c^6}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{108392221996820991579377664a^8c^6 + 6575336744109767454300480a^9c^6}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{8164199124092113502400a^{10}c^6 - 2080877086126562051328a^{11}c^6}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-21558516560807978752a^{12}c^6 + 121341101729527680a^{13}c^6 + 2983367975812224a^{14}c^6}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{12147729834240a^{15}c^6 - 32015343360a^{16}c^6 - 273873600a^{17}c^6 - 320320a^{18}c^6}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{40877151497014378839771354551549952c^7 - 22219502427899702338520014030635008ac^7}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{4022878448009248326347020243828736a^2c^7 - 256858653782602724496822439018496a^3c^7}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-1641647966593763191402106634240a^4c^7 + 613388087046982794870551930880a^5c^7}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-2367132688592308795171872768a^6c^7 - 654998067407893710964829184a^7c^7}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-1523650746127540570315776a^8c^7 + 329539524916344426313344a^9c^7}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{3425646083934616768512a^{10}c^7 - 50038536300856097280a^{11}c^7 - 974138332318255104a^{12}c^7}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-2184451291486464a^{13}c^7 + 45506452992000a^{14}c^7 + 291087413760a^{15}c^7 + 283345920a^{16}c^7}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-823680a^{17}c^7 + 5832594412243055928973325422821376c^8}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-2618050661653803280443469114376192ac^8 + 379493114458898267502470696665088a^2c^8}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{-16864207890780906911526743900160a^3c^8 - 447720321025657093838032576512a^4c^8}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} + \\
& + \frac{37986129070713604063172198400a^5c^8 + 389769280200184576457945088a^6c^8}{\Gamma\left(\frac{c-a+1}{2}\right)\Gamma\left(\frac{c+a+48}{2}\right)} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{-31372314252822465838755840a^7c^8 - 411109178500644611480064a^8c^8}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{9363608406942489722880a^9c^8 + 187215352358190114816a^{10}c^8 - 146424613495480320a^{11}c^8}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-21752854863387648a^{12}c^8 - 123540894597120a^{13}c^8 + 173781104640a^{14}c^8}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{2503987200a^{15}c^8 + 3294720a^{16}c^8 + 662317910051181926669156716904448c^9}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-245400115796071532958765453148160ac^9 + 28153238255209821490041472417792a^2c^9}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-781005645276012502462741086208a^3c^9 - 42641895620379018617550274560a^4c^9}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{1612351973725244164720885760a^5c^9 + 39662648103197518265810944a^6c^9}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-926453550912364548243456a^7c^9 - 23555359060666652876800a^8c^9}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{100903225406804254720a^9c^9 + 5299360980595089408a^{10}c^9 + 24692042573406208a^{11}c^9}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-227873864458240a^{12}c^9 - 1996213739520a^{13}c^9 - 2571345920a^{14}c^9 + 5857280a^{15}c^9}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{60743744451907338804193681997824c^{10} - 18518348550706651821965710458880ac^{10}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{1653100889178452682493737828352a^2c^{10} - 21740721608271376099456843776a^3c^{10}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-2600813329461903794303729664a^4c^{10} + 42802618860435796873871360a^5c^{10}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{2038210720517206870835200a^6c^{10} - 12463849823864973467648a^7c^{10}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-758892596094305001472a^8c^{10} - 2575932665689743360a^9c^{10} + 83354346743635968a^{10}c^{10}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{679546442358784a^{11}c^{10} - 290098192384a^{12}c^{10} - 13243310080a^{13}c^{10} - 19914752a^{14}c^{10}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{4546715789559603603424633946112c^{11} - 1133943987191935145013892087808ac^{11}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{76868622553074562239414927360a^2c^{11} - 6333853945783824633298944a^3c^{11}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{-112614782541939583740936192a^4c^{11} + 383669909202609748246528a^5c^{11}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{67555227087049795731456a^6c^{11} + 197559515798431514624a^7c^{11}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-14999874634184294400a^8c^{11} - 121790210462269440a^9c^{11} + 596723478134784a^{10}c^{11}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{8090331791360a^{11}c^{11} + 13534789632a^{12}c^{11} - 25346048a^{13}c^{11}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{279714662512116971474262163456c^{12} - 56599454327811805687654121472ac^{12}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{2812155919136601281891139584a^2c^{12} + 34239457060775837590487040a^3c^{12}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-3555265567506078642012160a^4c^{12} - 21202879517144336793600a^5c^{12}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{1500614958719249924096a^6c^{12} + 13623195491897671680a^7c^{12} - 170239161849888768a^8c^{12}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-2179202261483520a^9c^{12} - 1109168406528a^{10}c^{12} + 43341742080a^{11}c^{12} + 76038144a^{12}c^{12}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{14202828556049274882760900608c^{13} - 2306244763812047662339850240ac^{13}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{79549699725335858543329280a^2c^{13} + 1970351955192820966359040a^3c^{13}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-81197049931788972195840a^4c^{13} - 1121385597257318400000a^5c^{13}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{21460893335812374528a^6c^{13} + 318310898510266368a^7c^{13} - 703360552796160a^8c^{13}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-20253520035840a^9c^{13} - 44148916224a^{10}c^{13} + 70189056a^{11}c^{13}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{596172495237225865390587904c^{14} - 76594063955412337515560960ac^{14}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{1673197695444638048976896a^2c^{14} + 67447668828029406412800a^3c^{14}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-1280086116620532449280a^4c^{14} - 28565196119329013760a^5c^{14}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{163144044077973504a^6c^{14} + 4184336248995840a^7c^{14} + 6613981593600a^8c^{14}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{-90493747200a^9c^{14} - 190513152a^{10}c^{14} + 20667778097297440376881152c^{15}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-2063368899940734098997248ac^{15} + 23616227634398246207488a^2c^{15}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{1609625006757485477888a^3c^{15} - 11946606167053565952a^4c^{15} - 457413975935680512a^5c^{15}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-102213608275968a^6c^{15} + 31611720302592a^7c^{15} + 91954348032a^8c^{15} - 127008768a^9c^{15}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{589580948824343210622976c^{16} - 44694485078557324214272ac^{16}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{136597103714150121472a^2c^{16} + 27691358161274142720a^3c^{16} - 16081668010082304a^4c^{16}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-4728686302986240a^5c^{16} - 14549489418240a^6c^{16} + 120658329600a^7c^{16} + 317521920a^8c^{16}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{13745163084312984158208c^{17} - 767797631994193510400ac^{17}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-2697012025875234816a^2c^{17} + 340925659342700544a^3c^{17} + 1206869439283200a^4c^{17}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-29915346370560a^5c^{17} - 122376683520a^6c^{17} + 149422080a^7c^{17}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{259068608527627976704c^{18} - 10245061664235847680ac^{18} - 86103626336960512a^2c^{18}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{2895000352849920a^3c^{18} + 16701453762560a^4c^{18} - 99365683200a^5c^{18} - 348651520a^6c^{18}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{3884083664023191552c^{19} - 102879574253109248ac^{19} - 1204310832578560a^2c^{19}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{15688841297920a^3c^{19} + 100631838720a^4c^{19} - 110100480a^5c^{19} + 45210938613170176c^{20}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-739630552973312ac^{20} - 9921293713408a^2c^{20} + 46022000640a^3c^{20} + 242221056a^4c^{20}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{393630531452928c^{21} - 3495365181440ac^{21} - 46552580096a^2c^{21} + 46137344a^3c^{21}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{2410953048064c^{22} - 9164554240ac^{22} - 96468992a^2c^{22} + 9261023232c^{23}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \\
& + \frac{-8388608ac^{23} + 16777216c^{24}}{\Gamma(\frac{c-a+1}{2}) \Gamma(\frac{c+a+48}{2})} + \frac{20007974164906320568399715106816000000}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{-36922405754626178036890405761515520000a}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{22065278387991542066307045169926144000a^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-5809841151573544819649225637045350400a^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{679890009913045305132937518437944320a^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-18472923622042793122488427319724288a^5 - 2560574556753342210803824950095424a^6}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{132219440896221918244499646073152a^7 + 5904047252981777731527533921776a^8}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-270614639795328768343142065008a^9 - 11480344457959138778418103724a^{10}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{191451864133347179813345532a^{11} + 13328712827913082236490801a^{12}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{73453466060412362003352a^{13} - 5838069209154766013234a^{14}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-119007946686312580908a^{15} - 64104578911758209a^{16} + 23731154067653472a^{17}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{293580605335336a^{18} + 706255392612a^{19} - 12674658689a^{20} - 115467528a^{21} - 326954a^{22}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{12a^{23} + a^{24} + 51436861851110719507236588764528640000c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-70899646160167879803660918205710336000ac}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{33418551215289286318709655103183257600a^2c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-6936716063495713404096607576151162880a^3c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{592162566124636481520902123469422592a^4c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-150763178991495629513120805163008a^5c - 2543564167189971442636762196069376a^6c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{45503143417288234509441538577152a^7c + 5720189897921291255677630092928a^8c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{-57850481183031873845533379072a^9c - 8079408263510288034016072320a^{10}c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-42658602715638740094989712a^{11}c + 5457516920998845643189704a^{12}c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{105080628717885503259304a^{13}c - 718597316917131560744a^{14}c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-42146779055614771736a^{15}c - 394633823765699760a^{16}c + 1815118515463440a^{17}c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{59605259080752a^{18}c + 390797915200a^{19}c + 260642536a^{20}c - 7396664a^{21}c - 27912a^{22}c}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-24a^{23}c + 53879676136106962853910284379095040000c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-58701850922925277436346363011137536000ac^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{22272862407231657294514826679624007680a^2c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-3645281850231197173180825687195828224a^3c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{213875375121643552409476002283352064a^4c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{6491596305419248116184393185321984a^5c^2 - 964599604570031846728877390420224a^6c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-5682533971627991823205758376832a^7c^2 + 1885588931111013766114178951680a^8c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{19394898395592969380873022336a^9c^2 - 1851518450114596444564235088a^{10}c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-39083335675241940394365144a^{11}c^2 + 580438231442930787182984a^{12}c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{25546912919341268358904a^{13}c^2 + 159272816221878580936a^{14}c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-3904286889491205360a^{15}c^2 - 70854972633732144a^{16}c^2 - 286985878971792a^{17}c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{2582951379008a^{18}c^2 + 30021551560a^{19}c^2 + 93509416a^{20}c^2 - 3432a^{21}c^2 - 312a^{22}c^2}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{32211699088981901572499271667679232000c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{-28512000389819083595321676326366085120ac}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{8790460634142328234758745607006846976a^2c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-1124467001863561580537016353123794944a^3c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{39708713605091532228302178253774848a^4c^3 + 3072311886315380216747428668760064a^5c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-186888540899160276337102312129024a^6c^3 - 5460277329981356928340767544064a^7c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{292228466284140197571175445760a^8c^3 + 8719189987830229672642717824a^9c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-165175187685162073177772832a^{10}c^3 - 7770572051846792035610672a^{11}c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-22875449892544073945120a^{12}c^3 + 2404075406651070648496a^{13}c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{35321722511563533760a^{14}c^3 - 16711413272084960a^{15}c^3 - 4275303741893184a^{16}c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-34756964834592a^{17}c^3 - 42598876320a^{18}c^3 + 641040400a^{19}c^3 + 2658656a^{20}c^3}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{2288a^{21}c^3 + 12673569486529179630190013064413184000c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-9247136634374056328148193250852732928ac^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{2322904856073730886919387342994735104a^2c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-227997454418110745446600708021592064a^3c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{3169731737784104346723877333917696a^4c^4 + 717153243408099923350630112145920a^5c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-18894426862062122171165144950016a^6c^4 - 1256503503761835993387006160128a^7c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{20005312090114578497340010368a^8c^4 + 1399506341758816898106208800a^9c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{1107293475704607644242608a^{10}c^4 - 714829981963561507018976a^{11}c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{-9234815852307223978800a^{12}c^4 + 80197368741037387840a^{13}c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{2582041372038150880a^{14}c^4 + 15258431854585920a^{15}c^4 - 78560643024864a^{16}c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-1260904925280a^{17}c^4 - 4363799440a^{18}c^4 + 160160a^{19}c^4 + 16016a^{20}c^4}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{3549767559427168161601437434501922816c^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-2151099368274358759726535915983601664ac^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{439330611840452027347549954963931136a^2c^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-32045308509021985102462728518369280a^3c^5 - 230117021186821381378230594748416a^4c^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{103351131588547583108228728397824a^5c^5 - 526153805312068114419158172672a^6c^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-156554337016017490934865859584a^7c^5 - 342370320670336052097249792a^8c^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{120430698898953310510476288a^9c^5 + 1514876828200500103475136a^{10}c^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-31496137302336777598528a^{11}c^5 - 792727673743617900288a^{12}c^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-2214018290093978368a^{13}c^5 + 83755863780580992a^{14}c^5 + 874309907382912a^{15}c^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{1577740260096a^{16}c^5 - 16154121984a^{17}c^5 - 74378304a^{18}c^5 - 64064a^{19}c^5}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{743559650440452121302608512460783616c^6 - 375380418098956909389583998592745472ac^6}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{61934956167026537832602378208935936a^2c^6 - 3176115614993973085877719175380992a^3c^6}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-97570846916520135171755792490496a^4c^6 + 9891668493540563867446482152448a^5c^6}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{116489775146410674839857159168a^6c^6 - 11974895925870999956260747776a^7c^6}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-187271227517652896016043008a^8c^6 + 5743465474229360858844864a^9c^6}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{144554417686389868597440a^{10}c^6 - 230607270695987657472a^{11}c^6}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-33251222890838208256a^{12}c^6 - 277238139202856832a^{13}c^6 + 778197251255424a^{14}c^6}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{20174474960640a^{15}c^6 + 78548870400a^{16}c^6 - 2882880a^{17}c^6 - 320320a^{18}c^6}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{120419109249818260699006806855254016c^7 - 50643920204146384742582467755507712ac^7}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{6678206027798100901235978413015040a^2c^7 - 216349934068120128428111178465280a^3c^7}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-13849802762834607412635933622272a^4c^7 + 634544063521152036454215260160a^5c^7}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{18576717170330425255016964096a^6c^7 - 556528190887633754610422784a^7c^7}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-17422709590477274298209280a^8c^7 + 107962987229429307820416a^9c^7}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{7038701856856382828544a^{10}c^7 + 44211950709134866944a^{11}c^7 - 681094885538715648a^{12}c^7}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-9700638027015936a^{13}c^7 - 23794160332800a^{14}c^7 + 184617438720a^{15}c^7 + 955468800a^{16}c^7}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{823680a^{17}c^7 + 15435801243454637955415444937506816c^8}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-5394264531666420310950929291542528ac^8 + 559524248170904730920655318548480a^2c^8}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-8736796136721904754238181933056a^3c^8 - 1237734142501349223302162522112a^4c^8}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{25253673488097375487494881280a^5c^8 + 1455699176221267243359055872a^6c^8}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-12031819362886782611902464a^7c^8 - 901850710109690716936704a^8c^8}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-3798874296621284474880a^9c^8 + 194341463383802701824a^{10}c^8}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{2337313594001498112a^{11}c^8 - 2395393722129408a^{12}c^8 - 161395768934400a^{13}c^8}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-718165493760a^{14}c^8 + 26357760a^{15}c^8 + 3294720a^{16}c^8}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{1592821042644515671417734442254336c^9 - 460335074446405836514058089529344ac^9}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{36708731576238908672976168681472a^2c^9 - 9269192159255026038805102592a^3c^9}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-77931011136370050568382054400a^4c^9 + 355242949210634290070487040a^5c^9}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{73346374205830358870228992a^6c^9 + 251928402592276494729216a^7c^9}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-29002037259752505794560a^8c^9 - 323984159153576796160a^9c^9}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{2604142834119450624a^{10}c^9 + 56843610573381632a^{11}c^9 + 183910257090560a^{12}c^9}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-1148723896320a^{13}c^9 - 6788587520a^{14}c^9 - 5857280a^{15}c^9}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{133944629219042741828987058651136c^{10} - 31792962283341780433921881669632ac^{10}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{1884977432671390301494262628352a^2c^{10} + 27453830985840912961790017536a^3c^{10}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-3577899019963626250693312512a^4c^{10} - 25831060180904558769373184a^5c^{10}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{2500762955655770765639680a^6c^{10} + 29770829896804480360448a^7c^{10}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-554861886520804335616a^8c^{10} - 10477914723705741312a^9c^{10} - 6504383856402432a^{10}c^{10}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{731660679766016a^{11}c^{10} + 3798320734208a^{12}c^{10} - 139403264a^{13}c^{10} - 19914752a^{14}c^{10}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{9259084618069199752092016705536c^{11} - 1788433975536396105112398856192ac^{11}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{74879477966758136016883679232a^2c^{11} + 2270097366668305229482033152a^3c^{11}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-119779384831109120949092352a^4c^{11} - 2108720637666398843895808a^5c^{11}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{56211218206919898071040a^6c^{11} + 1154277387520437207040a^7c^{11}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-4271295545929531392a^8c^{11} - 191483317319024640a^9c^{11} - 815139396943872a^{10}c^{11}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{4260696014848a^{11}c^{11} + 29350723584a^{12}c^{11} + 25346048a^{13}c^{11}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{529170073110991196497521934336c^{12} - 82199817672273746020257497088ac^{12}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{2226310998038921142800482304a^2c^{12} + 112335291284151811064856576a^3c^{12}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-2816859314269848893194240a^4c^{12} - 83269328357107000442880a^5c^{12}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{705630734345855811584a^6c^{12} + 26456679475060703232a^7c^{12} + 65094234212646912a^8c^{12}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-1995437837352960a^9c^{12} - 12430943895552a^{10}c^{12} + 456228864a^{11}c^{12} + 76038144a^{12}c^{12}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{25084567677926533835412996096c^{13} - 3087201226200895282242125824ac^{13}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{45090915657763002741948416a^2c^{13} + 3939189564189899494522880a^3c^{13}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-40575227582415871672320a^4c^{13} - 2139706573184788070400a^5c^{13}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-195459046294880256a^6c^{13} + 382648988297920512a^7c^{13} + 2188013035192320a^8c^{13}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-9832316928000a^9c^{13} - 81208737792a^{10}c^{13} - 70189056a^{11}c^{13}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{987125304445771508818640896c^{14} - 94450060802172951369613312ac^{14}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{392250491442329132466176a^2c^{14} + 102263791723363946987520a^3c^{14}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-108880942638335262720a^4c^{14} - 37648129311289835520a^5c^{14}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-187827301329862656a^6c^{14} + 3333038389985280a^7c^{14} + 25954876784640a^8c^{14}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-952565760a^9c^{14} - 190513152a^{10}c^{14} + 32197592876889535514935296c^{15}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-2337876825862944317243392ac^{15} - 10571276177233084940288a^2c^{15}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{1978662384171409211392a^3c^{15} + 10187017606434127872a^4c^{15} - 447086626545205248a^5c^{15}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} +
\end{aligned}$$

$$\begin{aligned}
& + \frac{-3611715821371392a^6c^{15} + 14233364594688a^7c^{15} + 146822135808a^8c^{15} + 127008768a^9c^{15}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{866877134589278443012096c^{16} - 46282113328159709462528ac^{16}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-539135018545206001664a^2c^{16} + 28101817396392886272a^3c^{16}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{266925771696439296a^4c^{16} - 3333037754941440a^5c^{16} - 34606714060800a^6c^{16}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{1270087680a^7c^{16} + 317521920a^8c^{16} + 19126537123824754753536c^{17}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-719582772331401969664ac^{17} - 12566499273518088192a^2c^{17} + 281603400092614656a^3c^{17}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{3578843352268800a^4c^{17} - 12558776401920a^5c^{17} - 172582502400a^6c^{17} - 149422080a^7c^{17}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{341997755091266830336c^{18} - 8538595036697198592ac^{18} - 189974093577060352a^2c^{18}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{1829902732492800a^3c^{18} + 28499821199360a^4c^{18} - 1045954560a^5c^{18} - 348651520a^6c^{18}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{4874760435045236736c^{19} - 73736935746568192ac^{19} - 1950607118172160a^2c^{19}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{6169186795520a^3c^{19} + 127055953920a^4c^{19} + 110100480a^5c^{19} + 54050689474625536c^{20}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{-423766867836928ac^{20} - 13199997927424a^2c^{20} + 484442112a^3c^{20} + 242221056a^4c^{20}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{449048494473216c^{21} - 1292583829504ac^{21} - 53196357632a^2c^{21} - 46137344a^3c^{21}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{2628587094016c^{22} - 96468992ac^{22} - 96468992a^2c^{22} + 9663676416c^{23}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} + \\
& + \frac{8388608ac^{23} + 16777216c^{24}}{\Gamma(\frac{c-a}{2}) \Gamma(\frac{c+a+49}{2})} \Big] \quad (8)
\end{aligned}$$

Derivation of result (8):

Substituting $b = -a - 48, z = \frac{1}{2}$ in given result (2), we get

$$(2a + 48) {}_2F_1 \left[\begin{matrix} a & , & -a - 48 & ; & \frac{1}{2} \\ & c & & & \end{matrix} \right]$$

$$= a {}_2F_1 \left[\begin{matrix} a+1 \\ c \end{matrix} ; -a-48 ; \frac{1}{2} \right] + (a+48) {}_2F_1 \left[\begin{matrix} a \\ c \end{matrix} ; -a-47 ; \frac{1}{2} \right]$$

Now applying same parallel method which is used in Ref[6], we can prove the main formula.

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Notes

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