Global Journal of Science Frontier Research: F
Mathematics and Decision Sciences
Volume 15 Issue 8 Version 1.0 Year 2015
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Two Incredible Summation Formula Involving Computational Technique

By Salahuddin, Upendra Kumar Pandit & M. P. Chaudhary
P.D.M College of Engineering, India

Abstract- In this paper, we have established two summation formulae with the help of contiguous relation and some derived formulae of Salahuddin et al.

Keywords: *contiguous relation, summation formulae.*

GJSFR-F Classification : MSC 2010: 33C05, 33C20, 33C60

TWOINCREDIBLESUMMATIONFORMULAINVOLVINGCOMPUTATIONALTECHNIQUE

Strictly as per the compliance and regulations of :

Two Incredible Summation Formula Involving Computational Technique

Salahuddin [α], Upendra Kumar Pandit [σ] & M. P. Chaudhary [ρ]

Abstract- In this paper, we have established two summation formulae with the help of contiguous relation and some derived formulae of Salahuddin et al.

Keywords: contiguous relation, summation formulae.

I. Introduction and Results Required

Special functions and their applications are now incredible in their scope, variety and depth. Not only in their expedicious growth in pure Mathematics and its applications to the traditional fields of Physics, Engineering and Statistics but in new fields of applications like Behavioral Science, Optimization, Biology, Environmental Science and Economics, etc. they are emerging. Summation formulae for hypergeometric function has an important role in applied mathematics.

Prudnikov et al. [2; p.414] derived the following seven summation formulae

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

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

$$ {}_2F_1\left[\begin{matrix} a, & 2-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{(a-1)\;2^{c-2}}\left[\frac{1}{\Gamma(\frac{c+a-2}{2})\,\Gamma(\frac{c-a+1}{2})} - \frac{1}{\Gamma(\frac{c+a-1}{2})\,\Gamma(\frac{c-a}{2})}\right] \tag{3} $$

$$ {}_2F_1\left[\begin{matrix} a, & 3-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{(a-1)(a-2)\;2^{c-3}}\left[\frac{(c-2)}{\Gamma(\frac{c+a-2}{2})\,\Gamma(\frac{c-a+1}{2})} - \frac{2}{\Gamma(\frac{c+a-3}{2})\,\Gamma(\frac{c-a}{2})}\right] \tag{4} $$

$$ {}_2F_1\left[\begin{matrix} a, & 4-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{(1-a)(2-a)(3-a)\;2^{c-4}}\left[\frac{(a-2c+3)}{\Gamma(\frac{c+a-4}{2})\,\Gamma(\frac{c-a+1}{2})} + \frac{(a+2c-7)}{\Gamma(\frac{c+a-3}{2})\,\Gamma(\frac{c-a}{2})}\right] \tag{5} $$

Author α: P.D.M College of Engineering, Bahadurgarh, Haryana, India. e-mails: sludn@yahoo.com, vsludn@gmail.com
Author σ: Department of Computer Engineering and Technology, Sri J. J. T. University, Jhunjhunu, Rajasthan, India. e-mail: upendrakumar1208@gmail.com
Author ρ: International Scientific Research and Welfare Organization, New Delhi, India. e-mail: mpchaudhary_2000@yahoo.com

$$ {}_2F_1\left[\begin{matrix} a, & 5-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-5}\{\prod_{\gamma=1}^{4}(\gamma-a)\}}\times $$

$$ \times\Big[\frac{\{2(c-2)(c-4)-(a-1)(a-4)\}}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-4}{2})}+\frac{(12-4c)}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-5}{2})}\Big] \tag{6} $$

$$ {}_2F_1\left[\begin{matrix} a, & 6-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-6}\{\prod_{\delta=1}^{5}(\delta-a)\}}\times $$

$$ \times\Big[\frac{(4c^2+2ac-a^2-a-34c+62)}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-5}{2})}-\frac{(4c^2-2ac-a^2+13a-22c+20)}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-6}{2})}\Big] \tag{7} $$

The contiguous relation is defined as Abramowitz et al. [1; p. 558]

$$ b\;{}_2F_1\left[\begin{matrix} a, & b+1 & ; & z \\ c & & ; & \end{matrix}\right] = (b-c+1)\;{}_2F_1\left[\begin{matrix} a, & b & ; & z \\ c & & ; & \end{matrix}\right] + (c-1)\;{}_2F_1\left[\begin{matrix} a, & b & ; & z \\ c-1 & & ; & \end{matrix}\right] \tag{8} $$

Salahuddin et al. [3 ; 4] derived the following eleven summation formulae

$$ {}_2F_1\left[\begin{matrix} a, & 7-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-7}\{\prod_{\varsigma=1}^{6}(\varsigma-a)\}}\times $$

$$ \times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-6}{2})}(-3a^2c+12a^2+21ac-84a+4c^3-48c^2+158c-120)+ $$

$$ +\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-7}{2})}(2a^2-14a-8c^2+64c-108)\Big] \tag{9} $$

$$ {}_2F_1\left[\begin{matrix} a, & 8-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-8}\{\prod_{\xi=1}^{7}(\xi-a)\}}\times $$

$$ \times\Big[\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-7}{2})}(-a^3-4a^2c+30a^2+4ac^2-4ac-107a+8c^3-124c^2+576c-762)+ $$

$$ +\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-8}{2})}(-a^3+4a^2c-6a^2+4ac^2-68ac+181a-8c^3+92c^2-288c+210)\Big] \tag{10} $$

$$ {}_2F_1\left[\begin{matrix} a, & 9-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-9}\{\prod_{\varpi=1}^{8}(\varpi-a)\}}\times $$

$$ \times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-8}{2})}(a^4-18a^3-8a^2c^2+80a^2c-85a^2+72ac^2-720ac+1494a+8c^4- $$

$$ -160c^3+1056c^2-2560c+1680)+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-9}{2})}\times $$

$$ \times(8a^2c-40a^2-72ac+360a-16c^3+240c^2-1072c+1360)\Big] \tag{11} $$

Ref

4. Salahuddin, Khola, R. K.:Certain new Hypergeometric Summation formulae arising from the sum-mation formulae of Salahuddin et al, (communicated).

$$
{}_2F_1\left[\begin{matrix} a, & 10-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-10}\{\prod_{\upsilon=1}^{9}(\upsilon-a)\}}\times
$$

$$
\times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-10}{2})}(-a^4-4a^3c+42a^3+12a^2c^2-72a^2c-107a^2+8ac^3-252ac^2+
$$

$$
+1772ac-3054a-16c^4+312c^3-2000c^2+4704c-3024)+
$$

$$
+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-9}{2})}(a^4-4a^3c+2a^3-12a^2c^2+192a^2c-
$$

$$
-553a^2+8ac^3-12ac^2-868ac+3406a+16c^4-392c^3+3320c^2-11224c+12264)\Big] \tag{12}
$$

$$
{}_2F_1\left[\begin{matrix} a, & 11-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-11}\{\prod_{\varphi=1}^{10}(\varphi-a)\}}\times
$$

$$
\times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-10}{2})}(5a^4c-30a^4-110a^3c+660a^3-20a^2c^3+360a^2c^2-1305a^2c-
$$

$$
-810a^2+220ac^3-3960ac^2+21010ac-31020a+16c^5-480c^4+
$$

$$
5240c^3-25200c^2+50544c-30240)+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-11}{2})}\times
$$

$$
\times(-2a^4+44a^3+24a^2c^2-288a^2c+530a^2-264ac^2+3168ac-8492a-32c^4+
$$

$$
768c^3-6352c^2+20928c-22320)\Big] \tag{13}
$$

$$
{}_2F_1\left[\begin{matrix} a, & 12-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-12}\{\prod_{\chi=1}^{11}(\chi-a)\}}\times
$$

$$
\times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-12}{2})}(a^5-6a^4c+9a^4-12a^3c^2+300a^3c-1103a^3+
$$

$$
+32a^2c^3-408a^2c^2+46a^2c+6351a^2+16ac^4-800ac^3+10364ac^2-46852ac+
$$

$$
+62182a-32c^5+944c^4-10112c^3+47656c^2-93776c+55440)+
$$

$$
+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-11}{2})}(a^5+6a^4c-69a^4-12a^3c^2+12a^3c+769a^3-32a^2c^3+840a^2c^2-
$$

$$
-5662a^2c+8301a^2+16ac^4-32ac^3-4612ac^2+42380ac-96002a+
$$

$$
+32c^5-1136c^4+15104c^3-92536c^2+255392c-245640)\Big] \tag{14}
$$

$$
{}_2F_1\left[\begin{matrix} a, & 13-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-13}\{\prod_{\beta=1}^{12}(\beta-a)\}}\times
$$

$$
\times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-12}{2})}(-a^6+39a^5+18a^4c^2-252a^4c+275a^4-468a^3c^2+6552a^3c
$$

$$
-18135a^3-48a^2c^4+1344a^2c^3-9834a^2c^2+5964a^2c+74246a^2+624ac^4-17472ac^3+
$$

$$+167388ac^2-631176ac+752856a+32c^6-1344c^5+$$

$$+21824c^4-172032c^3+674384c^2-1187424c+665280)+$$

$$+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-13}{2})}(-12a^4c+84a^4+312a^3c-2184a^3+64a^2c^3-1344a^2c^2+$$

$$+6620a^2c-2436a^2-832ac^3+17472ac^2-112424ac+216216a-64c^5+$$

$$+2240c^4-29312c^3+176512c^2-478752c+453600)\Big] \qquad (15)$$

$${}_2F_1\left[\begin{matrix} a, & 14-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right]=\frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-14}\{\prod_{\gamma=1}^{13}(\gamma-a)\}}\times$$

$$\times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-14}{2})}(a^6+6a^5c-87a^5-24a^4c^2+150a^4c+925a^4-32a^3c^3+1392a^3c^2-$$

$$-12706a^3c+24615a^3+80a^2c^4-1728a^2c^3+5368a^2c^2+58986a^2c-242486a^2+32ac^5-$$

$$-2320ac^4+47328ac^3-391568ac^2+1344076ac-1496568a-64c^6+2656c^5-42560c^4+$$

$$+330752c^3-1278144c^2+2222160c-1235520)+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-13}{2})}(-a^6+6a^5c-$$

$$-3a^5+24a^4c^2-570a^4c+2225a^4-32a^3c^3+48a^3c^2+7454a^3c-39225a^3-80a^2c^4+$$

$$+3072a^2c^3-35608a^2c^2+133626a^2c-68104a^2+$$

$$+32ac^5-80ac^4-19872ac^3+313808ac^2-1676564ac+$$

$$+2856228a+64c^6-3104c^5+59360c^4-566848c^3+2810304c^2-6724560c+5897520)\Big] \qquad (16)$$

$${}_2F_1\left[\begin{matrix} a, & 15-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right]=\frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-15}\{\prod_{\varepsilon=1}^{14}(\varepsilon-a)\}}\times$$

$$\times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-14}{2})}(-7a^6c+56a^6+315a^5c-2520a^5+56a^4c^3-1344a^4c^2+5103a^4c+$$

$$+16520a^4-1680a^3c^3+40320a^3c^2-271215a^3c+449400a^3-112a^2c^5+4480a^2c^4-54040a^2c^3+$$

$$+150080a^2c^2+845824a^2c-3383296a^2+1680ac^5-67200ac^4+999600ac^3-6787200ac^2+$$

$$+20482140ac-21070560a+64c^7-3584c^6+80864c^5-$$

$$-940800c^4+5987520c^3-20296192c^2+32464368c-17297280)+$$

$$+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-15}{2})}(2a^6-90a^5-48a^4c^2+768a^4c-$$

$$-1474a^4+1440a^3c^2-23040a^3c+77970a^3+160a^2c^4-5120a^2c^3+46640a^2c^2-$$

$$-90880a^2c-226192a^2-2400ac^4+76800ac^3-861600ac^2+3955200ac-6138120a-128c^6+$$

$$+6144c^5-116160c^4+1095680c^3-5363584c^2+12679168c-11009376)\Big] \qquad (17)$$

Notes

$$
{}_2F_1\left[\begin{matrix} a, & 16-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-16}\{\prod_{\zeta=1}^{15}(\zeta-a)\}}\times
$$

$$
\times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-16}{2})}(-a^7+8a^6c-12a^6+24a^5c^2-792a^5c+3710a^5-80a^4c^3+1080a^4c^2+
$$

$$
+6280a^4c-66600a^4-80a^3c^4+5280a^3c^3-85480a^3c^2+435480a^3c-458929a^3+192a^2c^5-
$$

$$
{}_6240a^2c^4+45200a^2c^3+271560a^2c^2-3746640a^2c+8942052a^2+64ac^6-6336ac^5+
$$

$$
+186000ac^4-2408160ac^3+15005072ac^2-42553152ac+41722740a-128c^7+7104c^6-
$$

$$
-158720c^5+1827360c^4-11505152c^3+38596416c^2-61194240c+32432400)+
$$

$$
+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-15}{2})}(-a^7-8a^6c+124a^6+24a^5c^2-24a^5c-2818a^5+
$$

$$
+80a^4c^3-3000a^4c^2+26360a^4c-40760a^4-80a^3c^4+160a^3c^3+45080a^3c^2-534760a^3c+
$$

$$
+1499471a^3-192a^2c^5+10080a^2c^4-175760a^2c^3+1189560a^2c^2-2226480a^2c-
$$

$$
-2760884a^2+64ac^6-192ac^5-75120ac^4+1782560ac^3-
$$

$$
-16394608ac^2+65703616ac-93008652a+128c^7-8128c^6+
$$

$$
+210944c^5-2878240c^4+22080512c^3-94015552c^2+202146816c-165145680)\Big] \tag{18}
$$

$$
{}_2F_1\left[\begin{matrix} a, & 17-a & ; & \frac{1}{2} \\ c & & ; & \end{matrix}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-17}\{\prod_{\vartheta=1}^{16}(\vartheta-a)\}}\times
$$

$$
\times\Big[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-16}{2})}(a^8-68a^7-32a^6c^2+576a^6c-638a^6+
$$

$$
+1632a^5c^2-29376a^5c+101320a^5+160a^4c^4-5760a^4c^3+44640a^4c^2+129600a^4c-1341071a^4-
$$

$$
-5440a^3c^4+195840a^3c^3-2303840a^3c^2+9743040a^3c-9832052a^3-256a^2c^6+
$$

$$
+13824a^2c^5-246560a^2c^4+1411200a^2c^3+4297408a^2c^2-64103040a^2c+
$$

$$
+143207628a^2+4352ac^6-235008ac^5+4977600ac^4-52289280ac^3+
$$

$$
+282566656ac^2-727036416ac+670152240a+128c^8-9216c^7+275456c^6-4423680c^5+
$$

$$
+41249792c^4-224907264c^3+683065344c^2-1014128640c+518918400+
$$

$$
+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-17}{2})}(16a^6c-144a^6-816a^5c+
$$

$$
+7344a^5-160a^4c^3+4320a^4c^2-22480a^4c-30960a^4+5440a^3c^3-
$$

$$
-146880a^3c^2+1157360a^3c-2484720a^3+384a^2c^5-17280a^2c^4+247840a^2c^3-
$$

$$
-1092960a^2c^2-1901760a^2c+15669504a^2-6528ac^5+293760ac^4-4999360ac^3+
$$

$$
+39804480ac^2-146267456ac+194890176a-256c^7+16128c^6-414976c^5+
$$

$$
+5610240c^4-42628864c^3+179788032c^2-383195904c+310867200)\Big] \tag{19}
$$

Notes

II. Main Summation Formulae

$$
{}_2F_1\left[\begin{array}{ccc} a, & 18-a & ; & \frac{1}{2} \\ c & & ; & \end{array}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-18}\{\prod_{\eta=1}^{17}(\eta-a)\}}\times
$$

$$
\times\Bigg[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-18}{2})}(-a^8-8a^7c+148a^7+40a^6c^2-256a^6c-3362a^6+80a^5c^3-4440a^5c^2+
$$
$$
+49664a^5c-103400a^5-240a^4c^4+5520a^4c^3+18760a^4c^2-849520a^4c+3240271a^4-192a^3c^5+
$$
$$
+17760a^3c^4-440560a^3c^3+4091160a^3c^2-12923320a^3c+3622852a^3+448a^2c^6-20352a^2c^5+
$$
$$
+253360a^2c^4+576240a^2c^3-31091248a^2c^2+192701168a^2c-344444908a^2+128ac^7-16576ac^6+660032ac^5-
$$
$$
-12228640ac^4+118499872ac^3-604789504ac^2+1488844864ac-1324543920a-256c^8+18304c^7-
$$
$$
-542976c^6+8650240c^5-79993344c^4+432549376c^3-1303568384c^2+1923025920c-980179200)+
$$
$$
+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-17}{2})}(a^8-8a^7c+4a^7-40a^6c^2+1264a^6c-6214a^6+80a^5c^3-120a^5c^2-
$$
$$
-32416a^5c+213904a^5+240a^4c^4-12720a^4c^3+186440a^4c^2-743120a^4c-456391a^4-
$$
$$
-192a^3c^5+480a^3c^4+216080a^3c^3-4278120a^3c^2+27569480a^3c-52277444a^3-448a^2c^6+
$$
$$
+30720a^2c^5-745840a^2c^4+7817520a^2c^3-30345632a^2c^2-19224224a^2c+253516684a^2+
$$
$$
+128ac^7-448ac^6-259264ac^5+8556320ac^4-118218848ac^3+813195488ac^2-
$$
$$
-2692403360ac+3335839536a+256c^8-20608c^7+696192c^6-12817024c^5+
$$
$$
+139638144c^4-913535872c^3+3463541888c^2-6848013696c+5284782720)\Bigg] \quad (20)
$$

$$
{}_2F_1\left[\begin{array}{ccc} a, & 19-a & ; & \frac{1}{2} \\ c & & ; & \end{array}\right] = \frac{\sqrt{\pi}\,\Gamma(c)}{2^{c-19}\{\prod_{\lambda=1}^{18}(\lambda-a)\}}\times
$$

$$
\times\Bigg[\frac{1}{\Gamma(\frac{c-a+1}{2})\,\Gamma(\frac{c+a-18}{2})}(9a^8c-90a^8-684a^7c+6840a^7-120a^6c^3+3600a^6c^2-14046a^6c-99540a^6+
$$
$$
+6840a^5c^3-205200a^5c^2+1664856a^5c-2968560a^5+432a^4c^5-21600a^4c^4+277080a^4c^3+
$$
$$
+327600a^4c^2-20793831a^4c+70898310a^4-16416a^3c^5+820800a^3c^4-14644440a^3c^3+
$$
$$
+111013200a^3c^2-315518940a^3c+131909400a^3-576a^2c^7+40320a^2c^6-992880a^2c^5+9324000a^2c^4+
$$
$$
+4429536a^2c^3-636886080a^2c^2+3695816316a^2c-6211091160a^2+10944ac^7-
$$
$$
-766080ac^6+21827808ac^5-325310400ac^4+2707726176ac^3-12394025280ac^2+
$$
$$
+28254838896ac-23908836960a+256c^9-23040c^8+880512c^7-18627840c^6+238347264c^5-
$$
$$
-1891123200c^4+9158978048c^3-25507261440c^2+35661692160c-17643225600)+
$$
$$
+\frac{1}{\Gamma(\frac{c-a}{2})\,\Gamma(\frac{c+a-19}{2})}(-2a^8+152a^7+80a^6c^2-1600a^6c+3148a^6-
$$

Notes

$$-4560a^5c^2 + 91200a^5c - 371488a^5 - 480a^4c^4 + 19200a^4c^3 - 185680a^4c^2 - 126400a^4c + 4559182a^4 +$$
$$+18240a^3c^4 - 729600a^3c^3 + 9799440a^3c^2 - 50068800a^3c + 73373288a^3 + 896a^2c^6 - 53760a^2c^5 +$$
$$+1107680a^2c^4 - 8467200a^2c^3 - 743936a^2c^2 + 274718720a^2c - 822056088a^2 -$$
$$-17024ac^6 + 1021440ac^5 - 24338240ac^4 + 292569600ac^3 - 1853708096ac^2 +$$
$$+5798641920ac - 6885423072a - 512c^8 + 40960c^7 - 1374464c^6 + 25123840c^5 - 271685888c^4 +$$
$$+1764075520c^3 - 6639757056c^2 + 13042437120c - 10013310720)\Big] \quad (21)$$

Notes

III. Derivation of the Main Formulae

Involving the contiguous relation (8) and the formula of Salahuddin et al. (19), one can established the result(20) and on the same way result(21) can be established.

References Références Referencias

1. Abramowitz, Milton., A and Stegun, Irene ; *Handbook of Mathematical Functions with Formulas, Graphs , and Mathematical Tables.* National Bureau of Standards, 1970.
2. Prudnikov, A.P., Brychkov, Yu. A. and Marichev, O.I.; *Integral and Series Vol 3: More Special Functions,* Nauka, Moscow, 2003.
3. Salahuddin, Khola, R. K.;New hypergeometric summation formulae arising from the summation formulae of Prudnikov, *South Asian Journal of Mathematics,* 4(2014),192-196.
4. Salahuddin, Khola, R. K.;Certain new Hypergeometric Summation formulae arising from the sum-mation formulae of Salahuddin et al, (communicated).

This page is intentionally left blank