In[1]:=
```
SetDirectory["c:/diskE/job2008/Zurich"];

(* http://www-ttp.particle.uni-karlsruhe.de/~asmirnov  *)
```

In[2]:=
```
<< MB/MB.m;
<< MB/MBresolve.m
```

```
MB 1.1

by Michal Czakon

more info in hep-ph/0511200

last modified 06 Mar 08

MBresolve 1.0

by Alexander Smirnov

last modified 22 Oct 08
```

In[4]:=
```
K2[a1_, a2_, a3_, a4_, a5_, a6_, a7_, a8_] :=
 ( x^z1 Gamma[-z1] Gamma[a2 + z1] Gamma[2 - a5 - a6 - a7 - ep - z1 - z2]
    Gamma[2 - a1 - a2 - a8 - ep + z2] Gamma[2 - a4 - a5 - a7 - ep - z1 - z3]
    Gamma[2 - a2 - a3 - a8 - ep + z3] Gamma[a7 + z1 - z4] Gamma[-2 + a4 + a5 + a6 + a7 + ep + z1 - z4]
    Gamma[a8 - z2 - z3 - z4] Gamma[-z1 - z2 - z3 - z4] Gamma[-2 + a1 + a2 + a3 + a8 + ep + z4]
    Gamma[z2 + z4] Gamma[z3 + z4] Gamma[a5 + z1 + z2 + z3 + z4]) /
  (Gamma[a2] Gamma[a4] Gamma[a5] Gamma[a6] Gamma[a7] Gamma[4 - a4 - a5 - a6 - a7 - 2 ep]
    Gamma[4 - a1 - a2 - a3 - a8 - 2 ep + z1 - z4]
    Gamma[a8 - z1 - z2 - z3 - z4] Gamma[a3 + z2 + z4] Gamma[a1 + z3 + z4])
```

In[5]:=
```
B2 = K2[1, 1, 1, 1, 1, 1, -1]
```

Out[5]=
```
(x^z1 Gamma[-z1] Gamma[1 + z1] Gamma[-1 - ep - z1 - z2]
   Gamma[1 - ep + z2] Gamma[-1 - ep - z1 - z3] Gamma[1 - ep + z3] Gamma[1 + z1 - z4]
   Gamma[2 + ep + z1 - z4] Gamma[-1 - z2 - z3 - z4] Gamma[-z1 - z2 - z3 - z4]
   Gamma[ep + z4] Gamma[z2 + z4] Gamma[z3 + z4] Gamma[1 + z1 + z2 + z3 + z4]) /
 (Gamma[-2 ep] Gamma[2 - 2 ep + z1 - z4] Gamma[-1 - z1 - z2 - z3 - z4]
   Gamma[1 + z2 + z4] Gamma[1 + z3 + z4])
```

In[6]:=
```
MBoptimizedRules[B2, ep -> 0, {}, {ep}]
```

MBrules::norules : no rules could be found to regulate this integral

Out[6]=
```
{}
```

In[7]:=
```
MBresolve[B2, ep]
```

```
CREATING RESIDUES LIST1.8281 seconds
FAILED TO RESOLVE
```

Out[7]=
```
False
```

In[10]:=
```
B2 = K2[1, 1, 1, 1, 1, 1, -1 + y];
```

In[11]:=
```
rul = MBoptimizedRules[B2, y → 0, {}, {y, ep}]
```

MBresidues::contour : contour starts and/or ends on a pole of Gamma[2 + 2 ep + y + z1]

MBresidues::contour : contour starts and/or ends on a pole of Gamma[1 + ep + y + z1]

MBresidues::contour : contour starts and/or ends on a pole of Gamma[2 ep + y − z3]

General::stop : Further output of MBresidues::contour will be suppressed during this calculation. ≫

MBrules::norules : no rules could be found to regulate this integral

MBrules::norules : no rules could be found to regulate this integral

MBrules::norules : no rules could be found to regulate this integral

General::stop : Further output of MBrules::norules will be suppressed during this calculation. ≫

Out[11]= $\left\{\left\{y \to \frac{55}{128}, \text{ep} \to -\frac{107}{384}\right\}, \left\{z1 \to -\frac{1}{6}, z2 \to -\frac{73}{96}, z3 \to -\frac{295}{384}, z4 \to \frac{19}{24}\right\}\right\}$

In[12]:=
```
con1 = MBcontinue[B2, y → 0, rul];
```

```
Level 1
Taking -residue in z4 = -1 + y - z2 - z3
Level 2
Integral {1}
Taking +residue in z1 = -y
Taking -residue in z2 = -1 + y
Taking -residue in z3 = -1 + y
Level 3
Integral {1, 1}
Integral {1, 2}
Taking +residue in z1 = -y
Taking -residue in z3 = -1 + y
Integral {1, 3}
Taking +residue in z1 = -y
Level 4
Integral {1, 2, 1}
Integral {1, 2, 2}
Taking +residue in z1 = -y
Integral {1, 3, 1}
Level 5
Integral {1, 2, 2, 1}
9 integral(s) found
```

In[13]:=
```
exp1 = MBexpand[con1, 1, {y, 0, 0}] // MBmerge;
```

In[14]:=
```
con2 = Table[MBcontinue[exp1[[i, 1]], ep → 0, exp1[[i, 2]]], {i, Length[exp1]}] // MBmerge;
```

```
Level 1
```

```
1 integral(s) found
Level 1
1 integral(s) found
Level 1
Taking -residue in z2 = -1 - ep
Level 2
Integral {1}
2 integral(s) found
Level 1
Taking -residue in z3 = -1 - ep
Level 2
Integral {1}
2 integral(s) found
Level 1
Taking -residue in z2 = -1 - ep - z1
Level 2
Integral {1}
2 integral(s) found
Level 1
Taking -residue in z3 = -1 - ep - z1
Level 2
Integral {1}
2 integral(s) found
Level 1
Taking -residue in z2 = -1 - ep
Taking -residue in z3 = -1 - ep
Level 2
Integral {1}
Taking -residue in z3 = -1 - ep
Integral {2}
Level 3
Integral {1, 1}
4 integral(s) found
Level 1
Taking -residue in z2 = -1 - ep - z1
Taking -residue in z3 = -1 - ep - z1
Level 2
```

```
Integral {1}
Taking -residue in z3 = -1 - ep - z1
Integral {2}
Level 3
Integral {1, 1}
4 integral(s) found
Level 1
Taking -residue in z2 = -1 - ep - z1
Taking -residue in z3 = -1 - ep - z1
Level 2
Integral {1}
Taking -residue in z3 = -1 - ep - z1
Taking +residue in z4 = 1 + ep + z1
Integral {2}
Taking +residue in z4 = 1 + ep + z1
Level 3
Integral {1, 1}
Taking +residue in z4 = 1 + 2 ep + z1
...no contribution
Taking +residue in z4 = 1 + ep + z1
Integral {1, 2}
Integral {2, 1}
Level 4
Integral {1, 1, 1}
7 integral(s) found
```

In[15]:= **exp2 = MBexpand[con2, Exp[2 ep EulerGamma], {ep, 0, 0}] // MBmerge**

Out[15]= $\{\text{MBint}[\frac{1}{1440\,\text{ep}^4}(3240 - 2820\,\text{ep}^2\pi^2 + 31\,\text{ep}^4\pi^4 + 9720\,\text{ep}^3\,\text{PolyGamma}[2,1] - 480\,\text{ep}\,\text{Log}[x](6 - \text{ep}^2\pi^2 + 14\,\text{ep}^3\,\text{PolyGamma}[2,1])), \{\{y\to 0, \text{ep}\to 0\}, \{\}\}],$

$\text{MBint}[-\frac{1}{\text{ep}} 2\,x^{z1}\,\text{Gamma}[-z1]^2\,\text{Gamma}[z1]\,\text{Gamma}[1+z1] (\text{Gamma}[-z1]\,\text{Gamma}[1+z1](-1+\text{ep EulerGamma} + 4\,\text{ep PolyGamma}[0,-z1] - 2\,\text{ep PolyGamma}[0, z1] - \text{ep PolyGamma}[0, 1+z1]) + \text{Gamma}[1-z1]\,\text{Gamma}[z1](3 - \text{ep EulerGamma} - 8\,\text{ep PolyGamma}[0,-z1] + 2\,\text{ep PolyGamma}[0,z1] + 5\,\text{ep PolyGamma}[0,1+z1])),$

$\{\{y\to 0, \text{ep}\to 0\}, \{z1 \to -\frac{1}{6}\}\}], \text{MBint}[\frac{1}{\text{ep}}\text{Gamma}[-1-z2]^2\,\text{Gamma}[1+z2]^2 (-1 - 2\,\text{ep EulerGamma} + \text{ep PolyGamma}[0,-1-z2] - 3\,\text{ep PolyGamma}[0, 2+z2]),$

$\{\{y\to 0, \text{ep}\to 0\}, \{z2 \to -\frac{73}{96}\}\}],$

$\text{MBint}[\frac{1}{\text{ep}}\text{Gamma}[-1-z3]^2\,\text{Gamma}[1+z3]^2 (-1 - 2\,\text{ep EulerGamma} + \text{ep PolyGamma}[0,-1-z3] - 3\,\text{ep PolyGamma}[0, 2+z3]),$

$\{\{y\to 0, \text{ep}\to 0\}, \{z3 \to -\frac{295}{384}\}\}], \text{MBint}[\frac{1}{\text{Gamma}[2+z1+z2]} 2\,x^{z1}\,\text{Gamma}[-z1]\,\text{Gamma}[1+z1]\,\text{Gamma}[-1-z2]\,\text{Gamma}[1+z2]\,\text{Gamma}[1+z1+z2] (\text{Gamma}[-z1]\,\text{Gamma}[1+z1]\,\text{Gamma}[-z1-z2]\,\text{Gamma}[1+z1+z2] + \text{Gamma}[1-z1]\,\text{Gamma}[z1]\,\text{Gamma}[-1-z1-z2]\,\text{Gamma}[2+z1+z2]),$

$\{\{y\to 0, \text{ep}\to 0\}, \{z1 \to -\frac{1}{6}, z2 \to -\frac{73}{96}\}\}], \text{MBint}[\frac{1}{\text{Gamma}[2+z1+z3]} 2\,x^{z1}\,\text{Gamma}[-z1]\,\text{Gamma}[1+z1]\,\text{Gamma}[-1-z3]\,\text{Gamma}[1+z3]\,\text{Gamma}[1+z1+z3] (\text{Gamma}[-z1]\,\text{Gamma}[1+z1]\,\text{Gamma}[-z1-z3]\,\text{Gamma}[1+z1+z3] + \text{Gamma}[1-z1]\,\text{Gamma}[z1]\,\text{Gamma}[-1-z1-z3]\,\text{Gamma}[2+z1+z3]),$

$\{\{y\to 0, \text{ep}\to 0\}, \{z1 \to -\frac{1}{6}, z3 \to -\frac{295}{384}\}\}]\}$

(**)

In[17]:= **B2 = K2[1, 1, 1, 1, 1, 1, 1, -1 + y]**

Out[17]= $(x^{z1}\,\text{Gamma}[-z1]\,\text{Gamma}[1+z1]\,\text{Gamma}[-1-\text{ep}-z1-z2]\,\text{Gamma}[1-\text{ep}-y+z2]\,\text{Gamma}[-1-\text{ep}-z1-z3]\,\text{Gamma}[1-\text{ep}-y+z3]\,\text{Gamma}[1+z1-z4]\,\text{Gamma}[2+\text{ep}+z1-z4]\,\text{Gamma}[-1+y-z2-z3-z4]\,\text{Gamma}[-z1-z2-z3-z4]\,\text{Gamma}[\text{ep}+y+z4]\,\text{Gamma}[z2+z4]\,\text{Gamma}[z3+z4]\,\text{Gamma}[1+z1+z2+z3+z4]) / (\text{Gamma}[-2\,\text{ep}]\,\text{Gamma}[2-2\,\text{ep}-y+z1-z4]\,\text{Gamma}[-1+y-z1-z2-z3-z4]\,\text{Gamma}[1+z2+z4]\,\text{Gamma}[1+z3+z4])$

In[19]:= **res1 = MBresolve[B2, {ep → 0, y → 0}]**

```
CREATING RESIDUES LIST..........3.8125 seconds
EVALUATING RESIDUES..........0.4375 seconds
```

Out[19]= $\{\text{MBint}[\frac{4\,\text{EulerGamma}^2\,x^{-2\,\text{ep}-y}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]}{\text{Gamma}[1-\text{ep}]} + \frac{2\,\text{EulerGamma}\,x^{-2\,\text{ep}-y}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{Log}[x]}{\text{Gamma}[1-\text{ep}]} + \frac{1}{\text{Gamma}[1-\text{ep}]} 2\,\text{EulerGamma}\,x^{-2\,\text{ep}-y}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[0,-2\,\text{ep}] + \frac{1}{\text{Gamma}[1-\text{ep}]} 2\,\text{EulerGamma}\,x^{-2\,\text{ep}-y}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[0,-\text{ep}] - \frac{1}{\text{Gamma}[1-\text{ep}]} 2\,\text{EulerGamma}\,x^{-2\,\text{ep}-y}\,\text{Gamma}[-\text{ep}]^2$

```
Gamma[1 + ep] Gamma[1 + 2 ep] PolyGamma[0, 1 + 2 ep] + 1/Gamma[1 - ep]
2 EulerGamma x^(-2 ep-y) Gamma[-ep]^2 Gamma[1 + ep] Gamma[1 + 2 ep] PolyGamma[0, 1 - 2 ep - y] +
x^(-2 ep-y) Gamma[-ep]^2 Gamma[1 + ep] Gamma[1 + 2 ep] PolyGamma[1, 1 - ep] / Gamma[1 - ep] -
x^(-2 ep-y) Gamma[-ep]^2 Gamma[1 + ep] Gamma[1 + 2 ep] PolyGamma[1, -ep] / Gamma[1 - ep] +
1/2 (-1/Gamma[1 - ep] Gamma[-ep]^2 Gamma[1 + ep] Gamma[1 + 2 ep]
    (-2 (2 EulerGamma^2 + 2 (EulerGamma^2 + Pi^2/6)) x^(-2 ep-y) - 8 EulerGamma x^(-2 ep-y) Log[x] -
      2 x^(-2 ep-y) Log[x]^2) - 2 (-(4 EulerGamma x^(-2 ep-y) Gamma[-ep]^2 Gamma[1 + ep] / Gamma[1 - ep]) -
      2 x^(-2 ep-y) Gamma[-ep]^2 Gamma[1 + ep] Log[x] / Gamma[1 - ep]) (-EulerGamma Gamma[1 + 2 ep] +
      Gamma[1 + 2 ep] PolyGamma[0, -2 ep] + Gamma[1 + 2 ep] PolyGamma[0, -ep] -
      Gamma[1 + 2 ep] PolyGamma[0, 1 + 2 ep] + Gamma[1 + 2 ep] PolyGamma[0, 1 - 2 ep - y]) +
    1/Gamma[1 - ep] 2 x^(-2 ep-y) Gamma[-ep]^2 Gamma[1 + ep]
     (2 Gamma[1 + 2 ep] PolyGamma[0, -2 ep] PolyGamma[0, -ep] +
      2 (Gamma[1 + 2 ep] PolyGamma[0, -2 ep] + Gamma[1 + 2 ep] PolyGamma[0, -ep])
       (-EulerGamma - PolyGamma[0, 1 + 2 ep] + PolyGamma[0, 1 - 2 ep - y]) +
      Gamma[1 + 2 ep] (PolyGamma[0, -2 ep]^2 + PolyGamma[1, -2 ep]) +
      Gamma[1 + 2 ep] (PolyGamma[0, -ep]^2 + PolyGamma[1, -ep]) + Gamma[1 + 2 ep]
       (-Pi^2/3 + PolyGamma[0, 1 + 2 ep]^2 - 2 PolyGamma[0, 1 + 2 ep] PolyGamma[0, 1 - 2 ep - y] +
        PolyGamma[0, 1 - 2 ep - y]^2 - 2 EulerGamma (-PolyGamma[0, 1 + 2 ep] + PolyGamma[
            0, 1 - 2 ep - y]) + PolyGamma[1, 1 + 2 ep] + PolyGamma[1, 1 - 2 ep - y]))),
 {{ep -> 0}, {}}], MBint[-(2 EulerGamma x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4]
     Gamma[1 - 2 ep - y - z4]^2 Gamma[z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4]) /
   (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) +
  (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2
     Gamma[z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, 1 - ep]) /
   (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) -
  (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2
     Gamma[z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, -ep]) /
   (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) -
  (2 x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2 Gamma[z4]
     Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, 1 - 2 ep - y - z4]) /
   (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) +
  (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2 Gamma[z4]
     Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, -1 + ep + y + z4]) /
   (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) -
  (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2
     Gamma[z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, ep + y + z4]) /
   (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]), {{ep -> 0}, {z4 -> 1.18859}}],
 MBint[-(2 EulerGamma x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4]
```

```
      Gamma[1 - 2 ep - y - z4]^2 Gamma[z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4]) /
    (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) +
   (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2
      Gamma[z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, 1 - ep]) /
    (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) -
   (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2
      Gamma[z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, -ep]) /
    (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) -
   (2 x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2 Gamma[z4]
      Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, 1 - 2 ep - y - z4]) /
    (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) +
   (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2 Gamma[z4]
      Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, -1 + ep + y + z4]) /
    (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]) -
   (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - y - z4] Gamma[1 - 2 ep - y - z4]^2
      Gamma[z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4] PolyGamma[0, ep + y + z4]) /
    (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y]), {{ep -> 0}, {z4 -> 1.19354}}],
MBint[(x^(-1+z4) Gamma[1 + ep] Gamma[-1 + y - z3] Gamma[1 - ep - y + z3]^2 Gamma[2 - y - z4]
    Gamma[-ep - z3 - z4]^2 Gamma[z4] Gamma[-1 + y + z4] Gamma[ep + y + z4] Gamma[z3 + z4]) /
  (Gamma[-2 ep] Gamma[1 - 2 ep - y] Gamma[y - z3] Gamma[1 + z3 + z4]),
 {{ep -> 0}, {z3 -> -1.07763, z4 -> 1.1663}}],
MBint[(x^(-1+z4) Gamma[-ep]^2 Gamma[1 + ep] Gamma[1 + 2 ep] Gamma[1 - z4]
    Gamma[1 - 2 ep - y - z4]^2 Gamma[z4] Gamma[ep + y + z4] Gamma[-1 + 2 ep + y + z4]) /
  (Gamma[1 - ep]^2 Gamma[1 - 2 ep - y] Gamma[2 ep + y]),
 {{ep -> 0}, {z4 -> 0.649289}}],
MBint[(x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[-1 + ep + y - z3] Gamma[1 - ep - y + z3]
    Gamma[1 - z4] Gamma[1 - 2 ep - y - z4] Gamma[-ep - z3 - z4] Gamma[1 + ep - z3 - z4]
    Gamma[z4] Gamma[ep + y + z4] Gamma[z3 + z4] Gamma[-ep + z3 + z4]) /
  (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y] Gamma[ep + y - z3 - z4] Gamma[1 + z3 + z4]),
 {{ep -> 0}, {z3 -> -0.965164, z4 -> 0.969365}}],
MBint[(x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[-1 + ep + y - z2] Gamma[1 - ep - y + z2]
    Gamma[1 - z4] Gamma[1 - 2 ep - y - z4] Gamma[-ep - z2 - z4] Gamma[1 + ep - z2 - z4]
    Gamma[z4] Gamma[ep + y + z4] Gamma[z2 + z4] Gamma[-ep + z2 + z4]) /
  (Gamma[1 - ep] Gamma[-2 ep] Gamma[1 - 2 ep - y] Gamma[ep + y - z2 - z4] Gamma[1 + z2 + z4]),
 {{ep -> 0}, {z2 -> -0.046298, z4 -> 0.940037}}],
MBint[(x^(-1+z4) Gamma[1 + ep] Gamma[1 - ep - y + z2] Gamma[1 - ep - y + z3] Gamma[1 - z2 - z3 - 2 z4]
    Gamma[1 - z4] Gamma[-ep - z2 - z4] Gamma[-ep - z3 - z4] Gamma[-1 + y - z2 - z3 - z4]
    Gamma[z4] Gamma[ep + y + z4] Gamma[z2 + z4] Gamma[z3 + z4] Gamma[z2 + z3 + 2 z4]) /
  (Gamma[-2 ep] Gamma[1 - 2 ep - y] Gamma[y - z2 - z3 - 2 z4] Gamma[1 + z2 + z4] Gamma[1 + z3 + z4]),
 {{ep -> 0}, {z2 -> -0.195701, z3 -> -0.369613, z4 -> 0.372364}}],
MBint[(x^-y Gamma[-2 ep] Gamma[-ep]^2 Gamma[2 ep] Gamma[1 + 3 ep]) / Gamma[1 - ep],
 {{ep -> 0}, {}}],
MBint[(x^-y Gamma[-ep] Gamma[1 - y] Gamma[1 - y - z4] Gamma[1 - 2 ep - y - z4]
    Gamma[2 + ep - y - z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4]) /
  (Gamma[1 - ep] Gamma[2 - 2 ep - 2 y - z4]), {{ep -> 0}, {z4 -> 1.19354}}],
MBint[(x^-y Gamma[-ep] Gamma[1 - y] Gamma[1 - y - z4] Gamma[1 - 2 ep - y - z4]
    Gamma[2 + ep - y - z4] Gamma[-1 + y + z4] Gamma[-1 + ep + y + z4]) /
  (Gamma[1 - ep] Gamma[2 - 2 ep - 2 y - z4]), {{ep -> 0}, {z4 -> 1.19354}}],
MBint[(x^-y Gamma[1 - y] Gamma[-1 + y - z3] Gamma[-1 - ep + y - z3]
    Gamma[1 - ep - y + z3] Gamma[1 - y - z4] Gamma[2 + ep - y - z4]
    Gamma[-ep - z3 - z4] Gamma[ep + y + z4] Gamma[z3 + z4] Gamma[-ep + z3 + z4]) /
  (Gamma[-2 ep] Gamma[y - z3] Gamma[2 - 2 ep - 2 y - z4] Gamma[1 + z3 + z4]),
```

```
 {{ep → 0}, {z3 → -1.24579, z4 → 1.87263}}],
MBint[(x^z1 Gamma[-ep]^2 Gamma[1 + ep] Gamma[1 - y - z1] Gamma[-ep - y - z1]^2
    Gamma[1 + z1] Gamma[y + z1]^2 Gamma[1 + ep + y + z1]) /
  (Gamma[-2 ep] Gamma[1 - 2 ep + z1]), {{ep → 0}, {z1 → -0.377479}}],
MBint[(x^z1 Gamma[-ep] Gamma[1 - y - z1] Gamma[-ep - y - z1] Gamma[1 + z1]
    Gamma[y + z1] Gamma[1 - ep - y - z4] Gamma[1 + z1 - z4] Gamma[2 + ep + z1 - z4]
    Gamma[-1 + y + z4] Gamma[ep + y + z4] Gamma[-1 - ep - z1 + z4]) /
  (Gamma[-2 ep] Gamma[2 - 2 ep - y + z1 - z4] Gamma[y + z4]),
 {{ep → 0}, {z1 → -0.731822, z4 → 0.76808}}],
MBint[(x^z1 Gamma[-ep] Gamma[1 - y - z1] Gamma[-ep - y - z1] Gamma[1 + z1]
    Gamma[y + z1] Gamma[1 - ep - y - z4] Gamma[1 + z1 - z4] Gamma[2 + ep + z1 - z4]
    Gamma[-1 + y + z4] Gamma[ep + y + z4] Gamma[-1 - ep - z1 + z4]) /
  (Gamma[-2 ep] Gamma[2 - 2 ep - y + z1 - z4] Gamma[y + z4]),
 {{ep → 0}, {z1 → -0.547767, z4 → 0.832684}}],
MBint[(x^z1 Gamma[1 - y - z1] Gamma[1 + z1] Gamma[y + z1] Gamma[-1 + y - z3]
    Gamma[-1 - ep - z1 - z3] Gamma[1 - ep - y + z3] Gamma[1 + z1 - z4] Gamma[2 + ep + z1 - z4]
    Gamma[-ep - z3 - z4] Gamma[ep + y + z4] Gamma[z3 + z4] Gamma[-ep - y - z1 + z3 + z4]) /
  (Gamma[-2 ep] Gamma[y - z3] Gamma[2 - 2 ep - y + z1 - z4] Gamma[1 + z3 + z4]),
 {{ep → 0}, {z1 → -0.515369, z3 → -0.80967, z4 → 0.760071}}],
MBint[(x^z1 Gamma[-z1] Gamma[1 + z1] Gamma[-1 - ep - z1 - z2] Gamma[1 - ep - y + z2]
    Gamma[-1 - ep - z1 - z3] Gamma[1 - ep - y + z3] Gamma[1 + z1 - z4]
    Gamma[2 + ep + z1 - z4] Gamma[-1 + y - z2 - z3 - z4] Gamma[-z1 - z2 - z3 - z4]
    Gamma[ep + y + z4] Gamma[z2 + z4] Gamma[z3 + z4] Gamma[1 + z1 + z2 + z3 + z4]) /
  (Gamma[-2 ep] Gamma[2 - 2 ep - y + z1 - z4] Gamma[-1 + y - z1 - z2 - z3 - z4]
    Gamma[1 + z2 + z4] Gamma[1 + z3 + z4]),
 {{ep → 0}, {z1 → -0.562672, z2 → -0.523479, z3 → -0.450782, z4 → 0.811527}}]}
```

In[20]:=
```
res2 = MBpreselect[res1, {y, 0, 0}]
```

In[21]:=
```
res3 = MBexpand[res2, 1, {y, 0, 0}]
```

Out[21]=
$$\left\{\text{MBint}\left[\frac{4\,\text{EulerGamma}^2\,x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]}{\Gamma[1-ep]}+\right.\right.$$

$$\frac{4\,\text{EulerGamma}\,x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{Log}[x]}{\Gamma[1-ep]}+$$

$$\frac{x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{Log}[x]^2}{\Gamma[1-ep]}+\frac{1}{\Gamma[1-ep]}$$

$$4\,\text{EulerGamma}\,x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{PolyGamma}[0,\,1-2\,ep]+$$

$$\frac{1}{\Gamma[1-ep]}2\,x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{Log}[x]\,\text{PolyGamma}[0,\,1-2\,ep]+$$

$$\frac{x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{PolyGamma}[0,\,1-2\,ep]^2}{\Gamma[1-ep]}+\frac{1}{\Gamma[1-ep]}$$

$$4\,\text{EulerGamma}\,x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{PolyGamma}[0,\,-2\,ep]+$$

$$\frac{1}{\Gamma[1-ep]}2\,x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{Log}[x]\,\text{PolyGamma}[0,\,-2\,ep]+$$

$$\frac{1}{\Gamma[1-ep]}2\,x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{PolyGamma}[0,\,1-2\,ep]$$

$$\text{PolyGamma}[0,\,-2\,ep]+\frac{x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{PolyGamma}[0,\,-2\,ep]^2}{\Gamma[1-ep]}+$$

$$\left.\frac{1}{\Gamma[1-ep]}4\,\text{EulerGamma}\,x^{-2\,ep}\,\Gamma[-ep]^2\,\Gamma[1+ep]\,\Gamma[1+2\,ep]\,\text{PolyGamma}[0,\,-ep]+\right.$$

$$\frac{1}{\text{Gamma}[1-\text{ep}]}2\,x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{Log}[x]\,\text{PolyGamma}[0,\,-\text{ep}]+$$

$$\frac{1}{\text{Gamma}[1-\text{ep}]}2\,x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]$$

$$\text{PolyGamma}[0,\,1-2\,\text{ep}]\,\text{PolyGamma}[0,\,-\text{ep}]+\frac{1}{\text{Gamma}[1-\text{ep}]}$$

$$2\,x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[0,\,-2\,\text{ep}]\,\text{PolyGamma}[0,\,-\text{ep}]+$$

$$\frac{x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[0,\,-\text{ep}]^2}{\text{Gamma}[1-\text{ep}]}-\frac{1}{\text{Gamma}[1-\text{ep}]}$$

$$4\,\text{EulerGamma}\,x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[0,\,1+2\,\text{ep}]-$$

$$\frac{1}{\text{Gamma}[1-\text{ep}]}2\,x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{Log}[x]\,\text{PolyGamma}[0,\,1+2\,\text{ep}]-$$

$$\frac{1}{\text{Gamma}[1-\text{ep}]}2\,x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[0,\,1-2\,\text{ep}]$$

$$\text{PolyGamma}[0,\,1+2\,\text{ep}]-\frac{1}{\text{Gamma}[1-\text{ep}]}2\,x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]$$

$$\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[0,\,-2\,\text{ep}]\,\text{PolyGamma}[0,\,1+2\,\text{ep}]-\frac{1}{\text{Gamma}[1-\text{ep}]}$$

$$2\,x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[0,\,-\text{ep}]\,\text{PolyGamma}[0,\,1+2\,\text{ep}]+$$

$$\frac{x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[0,\,1+2\,\text{ep}]^2}{\text{Gamma}[1-\text{ep}]}+$$

$$\frac{x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[1,\,1-2\,\text{ep}]}{\text{Gamma}[1-\text{ep}]}+$$

$$\frac{x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[1,\,1-\text{ep}]}{\text{Gamma}[1-\text{ep}]}+$$

$$\frac{x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[1,\,-2\,\text{ep}]}{\text{Gamma}[1-\text{ep}]}+$$

$$\frac{x^{-2\,\text{ep}}\,\text{Gamma}[-\text{ep}]^2\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[1+2\,\text{ep}]\,\text{PolyGamma}[1,\,1+2\,\text{ep}]}{\text{Gamma}[1-\text{ep}]},\,\{\{\text{ep}\to 0\},\,\{\}\}\Big],$$

$$\text{MBint}\Big[-\left(2\,\text{EulerGamma}\,x^{-1+z4}\,\text{Gamma}[-\text{ep}]\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[2-z4]\,\text{Gamma}[1-2\,\text{ep}-z4]^2\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]\,\text{Gamma}[-1+\text{ep}+z4]\right)\Big/\left(\text{Gamma}[1-2\,\text{ep}]\,\text{Gamma}[1-\text{ep}]\,\text{Gamma}[-2\,\text{ep}]\right)+$$

$$\left(x^{-1+z4}\,\text{Gamma}[-\text{ep}]\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[2-z4]\,\text{Gamma}[1-2\,\text{ep}-z4]^2\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]\,\text{Gamma}[-1+\text{ep}+z4]\,\text{PolyGamma}[0,\,1-\text{ep}]\right)\Big/\left(\text{Gamma}[1-2\,\text{ep}]\,\text{Gamma}[1-\text{ep}]\,\text{Gamma}[-2\,\text{ep}]\right)-$$

$$\left(x^{-1+z4}\,\text{Gamma}[-\text{ep}]\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[2-z4]\,\text{Gamma}[1-2\,\text{ep}-z4]^2\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]\,\text{Gamma}[-1+\text{ep}+z4]\,\text{PolyGamma}[0,\,-\text{ep}]\right)\Big/\left(\text{Gamma}[1-2\,\text{ep}]\,\text{Gamma}[1-\text{ep}]\,\text{Gamma}[-2\,\text{ep}]\right)-$$

$$\left(2\,x^{-1+z4}\,\text{Gamma}[-\text{ep}]\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[2-z4]\,\text{Gamma}[1-2\,\text{ep}-z4]^2\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]\,\text{Gamma}[-1+\text{ep}+z4]\,\text{PolyGamma}[0,\,1-2\,\text{ep}-z4]\right)\Big/$$
$$\left(\text{Gamma}[1-2\,\text{ep}]\,\text{Gamma}[1-\text{ep}]\,\text{Gamma}[-2\,\text{ep}]\right)+$$
$$\left(x^{-1+z4}\,\text{Gamma}[-\text{ep}]\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[2-z4]\,\text{Gamma}[1-2\,\text{ep}-z4]^2\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]\,\text{Gamma}[-1+\text{ep}+z4]\,\text{PolyGamma}[0,\,-1+\text{ep}+z4]\right)\Big/$$
$$\left(\text{Gamma}[1-2\,\text{ep}]\,\text{Gamma}[1-\text{ep}]\,\text{Gamma}[-2\,\text{ep}]\right)-\left(x^{-1+z4}\,\text{Gamma}[-\text{ep}]\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[2-z4]\,\text{Gamma}[1-2\,\text{ep}-z4]^2\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]\,\text{Gamma}[-1+\text{ep}+z4]\,\text{PolyGamma}[0,\,\text{ep}+z4]\right)\Big/$$
$$\left(\text{Gamma}[1-2\,\text{ep}]\,\text{Gamma}[1-\text{ep}]\,\text{Gamma}[-2\,\text{ep}]\right),\,\{\{\text{ep}\to 0\},\,\{z4\to 1.18859\}\}\Big],\,\text{MBint}\Big[$$
$$-\left(2\,\text{EulerGamma}\,x^{-1+z4}\,\text{Gamma}[-\text{ep}]\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[2-z4]\,\text{Gamma}[1-2\,\text{ep}-z4]^2\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]\,\text{Gamma}[-1+\text{ep}+z4]\right)\Big/\left(\text{Gamma}[1-2\,\text{ep}]\,\text{Gamma}[1-\text{ep}]\,\text{Gamma}[-2\,\text{ep}]\right)+$$

$$\left(x^{-1+z4}\,\text{Gamma}[-\text{ep}]\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[2-z4]\,\text{Gamma}[1-2\,\text{ep}-z4]^2\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]\,\text{Gamma}[-1+\text{ep}+z4]\,\text{PolyGamma}[0,\,1-\text{ep}]\right)\Big/\left(\text{Gamma}[1-2\,\text{ep}]\,\text{Gamma}[1-\text{ep}]\,\text{Gamma}[-2\,\text{ep}]\right)-$$

$$\left(x^{-1+z4}\,\text{Gamma}[-\text{ep}]\,\text{Gamma}[1+\text{ep}]\,\text{Gamma}[2-z4]\,\text{Gamma}[1-2\,\text{ep}-z4]^2\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]\right)$$

```
    Gamma[-1 + ep + z4] PolyGamma[0, -ep]) / (Gamma[1 - 2 ep] Gamma[1 - ep] Gamma[-2 ep]) -
  (2 x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - z4] Gamma[1 - 2 ep - z4]^2 Gamma[-1 + z4]
    Gamma[z4] Gamma[-1 + ep + z4] PolyGamma[0, 1 - 2 ep - z4]) /
   (Gamma[1 - 2 ep] Gamma[1 - ep] Gamma[-2 ep]) +
  (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - z4] Gamma[1 - 2 ep - z4]^2
    Gamma[-1 + z4] Gamma[z4] Gamma[-1 + ep + z4] PolyGamma[0, -1 + ep + z4]) /
   (Gamma[1 - 2 ep] Gamma[1 - ep] Gamma[-2 ep]) - (x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[2 - z4]
    Gamma[1 - 2 ep - z4]^2 Gamma[-1 + z4] Gamma[z4] Gamma[-1 + ep + z4] PolyGamma[0, ep + z4]) /
   (Gamma[1 - 2 ep] Gamma[1 - ep] Gamma[-2 ep]), {{ep → 0}, {z4 → 1.19354}}],
MBint[(x^(-1+z4) Gamma[1 + ep] Gamma[-1 - z3] Gamma[1 - ep + z3]^2 Gamma[2 - z4]
    Gamma[-ep - z3 - z4]^2 Gamma[-1 + z4] Gamma[z4] Gamma[ep + z4] Gamma[z3 + z4]) /
  (Gamma[1 - 2 ep] Gamma[-2 ep] Gamma[-z3] Gamma[1 + z3 + z4]),
 {{ep → 0}, {z3 → -1.07763, z4 → 1.1663}}],
MBint[(x^(-1+z4) Gamma[-ep]^2 Gamma[1 + ep] Gamma[1 + 2 ep] Gamma[1 - z4]
    Gamma[1 - 2 ep - z4]^2 Gamma[z4] Gamma[ep + z4] Gamma[-1 + 2 ep + z4]) /
  (Gamma[1 - 2 ep] Gamma[1 - ep]^2 Gamma[2 ep]), {{ep → 0}, {z4 → 0.649289}}],
MBint[(x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[-1 + ep - z3] Gamma[1 - ep + z3]
    Gamma[1 - z4] Gamma[1 - 2 ep - z4] Gamma[-ep - z3 - z4] Gamma[1 + ep - z3 - z4]
    Gamma[z4] Gamma[ep + z4] Gamma[z3 + z4] Gamma[-ep + z3 + z4]) /
  (Gamma[1 - 2 ep] Gamma[1 - ep] Gamma[-2 ep] Gamma[ep - z3 - z4] Gamma[1 + z3 + z4]),
 {{ep → 0}, {z3 → -0.965164, z4 → 0.969365}}],
MBint[(x^(-1+z4) Gamma[-ep] Gamma[1 + ep] Gamma[-1 + ep - z2] Gamma[1 - ep + z2]
    Gamma[1 - z4] Gamma[1 - 2 ep - z4] Gamma[-ep - z2 - z4] Gamma[1 + ep - z2 - z4]
    Gamma[z4] Gamma[ep + z4] Gamma[z2 + z4] Gamma[-ep + z2 + z4]) /
  (Gamma[1 - 2 ep] Gamma[1 - ep] Gamma[-2 ep] Gamma[ep - z2 - z4] Gamma[1 + z2 + z4]),
 {{ep → 0}, {z2 → -0.046298, z4 → 0.940037}}],
MBint[(x^(-1+z4) Gamma[1 + ep] Gamma[1 - ep + z2] Gamma[1 - ep + z3] Gamma[1 - z2 - z3 - 2 z4]
    Gamma[1 - z4] Gamma[-ep - z2 - z4] Gamma[-ep - z3 - z4] Gamma[-1 - z2 - z3 - z4]
    Gamma[z4] Gamma[ep + z4] Gamma[z2 + z4] Gamma[z3 + z4] Gamma[z2 + z3 + 2 z4]) /
  (Gamma[1 - 2 ep] Gamma[-2 ep] Gamma[-z2 - z3 - 2 z4] Gamma[1 + z2 + z4] Gamma[1 + z3 + z4]),
 {{ep → 0}, {z2 → -0.195701, z3 → -0.369613, z4 → 0.372364}}],
MBint[Gamma[-2 ep] Gamma[-ep]^2 Gamma[2 ep] Gamma[1 + 3 ep] / Gamma[1 - ep], {{ep → 0}, {}}],
MBint[(Gamma[-ep] Gamma[1 - z4] Gamma[1 - 2 ep - z4] Gamma[2 + ep - z4] Gamma[-1 + z4]
    Gamma[-1 + ep + z4]) / (Gamma[1 - ep] Gamma[2 - 2 ep - z4]), {{ep → 0}, {z4 → 1.19354}}],
MBint[(Gamma[-ep] Gamma[1 - z4] Gamma[1 - 2 ep - z4] Gamma[2 + ep - z4] Gamma[-1 + z4]
    Gamma[-1 + ep + z4]) / (Gamma[1 - ep] Gamma[2 - 2 ep - z4]), {{ep → 0}, {z4 → 1.19354}}],
MBint[(Gamma[-1 - z3] Gamma[-1 - ep - z3] Gamma[1 - ep + z3] Gamma[1 - z4] Gamma[2 + ep - z4]
    Gamma[-ep - z3 - z4] Gamma[ep + z4] Gamma[z3 + z4] Gamma[-ep + z3 + z4]) /
  (Gamma[-2 ep] Gamma[-z3] Gamma[2 - 2 ep - z4] Gamma[1 + z3 + z4]),
 {{ep → 0}, {z3 → -1.24579, z4 → 1.87263}}],
MBint[(x^z1 Gamma[-ep]^2 Gamma[1 + ep] Gamma[1 - z1] Gamma[-ep - z1]^2 Gamma[z1]^2 Gamma[1 + z1]
    Gamma[1 + ep + z1]) / (Gamma[-2 ep] Gamma[1 - 2 ep + z1]), {{ep → 0}, {z1 → -0.377479}}],
MBint[(x^z1 Gamma[-ep] Gamma[1 - z1] Gamma[-ep - z1] Gamma[z1] Gamma[1 + z1]
    Gamma[1 - ep - z4] Gamma[1 + z1 - z4] Gamma[2 + ep + z1 - z4] Gamma[-1 + z4] Gamma[ep + z4]
    Gamma[-1 - ep - z1 + z4]) / (Gamma[-2 ep] Gamma[2 - 2 ep + z1 - z4] Gamma[z4]),
 {{ep → 0}, {z1 → -0.731822, z4 → 0.76808}}], MBint[
 (x^z1 Gamma[-ep] Gamma[1 - z1] Gamma[-ep - z1] Gamma[z1] Gamma[1 + z1] Gamma[1 - ep - z4] Gamma[
    1 + z1 - z4] Gamma[2 + ep + z1 - z4] Gamma[-1 + z4] Gamma[ep + z4] Gamma[-1 - ep - z1 + z4]) /
  (Gamma[-2 ep] Gamma[2 - 2 ep + z1 - z4] Gamma[z4]), {{ep → 0},
  {z1 → -0.547767, z4 → 0.832684}}],
MBint[(x^z1 Gamma[1 - z1] Gamma[z1] Gamma[1 + z1] Gamma[-1 - z3] Gamma[-1 - ep - z1 - z3]
    Gamma[1 - ep + z3] Gamma[1 + z1 - z4] Gamma[2 + ep + z1 - z4]
```

```
    Gamma[-ep - z3 - z4] Gamma[ep + z4] Gamma[z3 + z4] Gamma[-ep - z1 + z3 + z4]) /
   (Gamma[-2 ep] Gamma[-z3] Gamma[2 - 2 ep + z1 - z4] Gamma[1 + z3 + z4]),
  {{ep → 0}, {z1 → -0.515369, z3 → -0.80967, z4 → 0.760071}}],
 MBint[(x^z1 Gamma[-z1] Gamma[1 + z1] Gamma[-1 - ep - z1 - z2] Gamma[1 - ep + z2]
    Gamma[-1 - ep - z1 - z3] Gamma[1 - ep + z3] Gamma[1 + z1 - z4] Gamma[2 + ep + z1 - z4]
    Gamma[-1 - z2 - z3 - z4] Gamma[-z1 - z2 - z3 - z4] Gamma[ep + z4] Gamma[z2 + z4]
    Gamma[z3 + z4] Gamma[1 + z1 + z2 + z3 + z4]) / (Gamma[-2 ep] Gamma[2 - 2 ep + z1 - z4]
    Gamma[-1 - z1 - z2 - z3 - z4] Gamma[1 + z2 + z4] Gamma[1 + z3 + z4]),
  {{ep → 0}, {z1 → -0.562672, z2 → -0.523479, z3 → -0.450782, z4 → 0.811527}}]}
```

In[22]:=
```
res4 = MBpreselect[res3, {ep, 0, 0}]
```

In[24]:=
```
res5 = Simplify[MBexpand[res4, Exp[2 ep EulerGamma], {ep, 0, 0}]]
```

Out[24]=

$$\Big\{\text{MBint}\Big[\frac{5}{2\,\text{ep}^4}-\frac{19\,\pi^2}{12\,\text{ep}^2}-\frac{13\,\pi^4}{720}-\pi^2\,\text{Log}[x]^2+\frac{2\,\text{Log}[x]^3}{3\,\text{ep}}-\frac{\text{Log}[x]^4}{3}+\frac{47\,\text{PolyGamma}[2,1]}{6\,\text{ep}}-\frac{\text{Log}[x]\left(6-7\,\text{ep}^2\,\pi^2+20\,\text{ep}^3\,\text{PolyGamma}[2,1]\right)}{3\,\text{ep}^3},\{\{\text{ep}\to 0\},\{\}\}\Big],$$

$$\text{MBint}\Big[\frac{1}{\text{ep}}2\,x^{-1+z4}\,\text{Gamma}[1-z4]^2\,\text{Gamma}[2-z4]\,\text{Gamma}[-1+z4]^2\,\text{Gamma}[z4]\,(-1+\text{ep}\,\text{EulerGamma}+2\,\text{ep}\,\text{PolyGamma}[0,1-z4]-\text{ep}\,\text{PolyGamma}[0,z4]),\{\{\text{ep}\to 0\},\{z4\to 1.18859\}\}\Big],$$

$$\text{MBint}\Big[\frac{1}{\text{ep}}2\,x^{-1+z4}\,\text{Gamma}[1-z4]^2\,\text{Gamma}[2-z4]\,\text{Gamma}[-1+z4]^2\,\text{Gamma}[z4]\,(-1+\text{ep}\,\text{EulerGamma}+2\,\text{ep}\,\text{PolyGamma}[0,1-z4]-\text{ep}\,\text{PolyGamma}[0,z4]),\{\{\text{ep}\to 0\},\{z4\to 1.19354\}\}\Big],$$

$$\text{MBint}\Big[-\frac{1}{\text{ep}}2\,x^{-1+z4}\,\text{Gamma}[1-z4]^3\,\text{Gamma}[-1+z4]\,\text{Gamma}[z4]^2\,(-1+\text{ep}\,\text{EulerGamma}+4\,\text{ep}\,\text{PolyGamma}[0,1-z4]-2\,\text{ep}\,\text{PolyGamma}[0,-1+z4]-\text{ep}\,\text{PolyGamma}[0,z4]),\{\{\text{ep}\to 0\},\{z4\to 0.649289\}\}\Big],$$

$$\text{MBint}\Big[\frac{1}{\text{Gamma}[1+z3+z4]}2\,x^{-1+z4}\,\text{Gamma}[-1-z3]\,\text{Gamma}[1+z3]\,\text{Gamma}[1-z4]^2\,\text{Gamma}[1-z3-z4]\,\text{Gamma}[z4]^2\,\text{Gamma}[z3+z4]^2,\{\{\text{ep}\to 0\},\{z3\to -0.965164,\,z4\to 0.969365\}\}\Big],$$

$$\text{MBint}\Big[\frac{1}{\text{Gamma}[1+z2+z4]}2\,x^{-1+z4}\,\text{Gamma}[-1-z2]\,\text{Gamma}[1+z2]\,\text{Gamma}[1-z4]^2\,\text{Gamma}[1-z2-z4]\,\text{Gamma}[z4]^2\,\text{Gamma}[z2+z4]^2,\{\{\text{ep}\to 0\},\{z2\to -0.046298,\,z4\to 0.940037\}\}\Big],$$

$$\text{MBint}\Big[-\frac{120+180\,\text{ep}^2\,\pi^2+173\,\text{ep}^4\,\pi^4+520\,\text{ep}^3\,\text{PolyGamma}[2,1]}{480\,\text{ep}^4},\{\{\text{ep}\to 0\},\{\}\}\Big],$$

$$\text{MBint}\Big[-\frac{1}{\text{ep}}\text{Gamma}[1-z4]^2\,\text{Gamma}[-1+z4]^2\,(1+2\,\text{ep}\,\text{EulerGamma}-2\,\text{ep}\,\text{PolyGamma}[0,1-z4]+3\,\text{ep}\,\text{PolyGamma}[0,2-z4]+\text{ep}\,\text{PolyGamma}[0,-1+z4]),\{\{\text{ep}\to 0\},\{z4\to 1.19354\}\}\Big],$$

$$\text{MBint}\Big[-\frac{1}{\text{ep}}\text{Gamma}[1-z4]^2\,\text{Gamma}[-1+z4]^2\,(1+2\,\text{ep}\,\text{EulerGamma}-2\,\text{ep}\,\text{PolyGamma}[0,1-z4]+3\,\text{ep}\,\text{PolyGamma}[0,2-z4]+\text{ep}\,\text{PolyGamma}[0,-1+z4]),\{\{\text{ep}\to 0\},\{z4\to 1.19354\}\}\Big],$$

$$\text{MBint}\Big[-\frac{1}{\text{ep}}2\,x^{z1}\,\text{Gamma}[1-z1]\,\text{Gamma}[-z1]^2\,\text{Gamma}[z1]^2\,\text{Gamma}[1+z1]\,(1+\text{ep}\,\text{EulerGamma}-2\,\text{ep}\,\text{PolyGamma}[0,-z1]+3\,\text{ep}\,\text{PolyGamma}[0,1+z1]),\{\{\text{ep}\to 0\},\{z1\to -0.377479\}\}\Big],$$

$$\text{MBint}\Big[2\,x^{z1}\,\text{Gamma}[1-z1]\,\text{Gamma}[-z1]\,\text{Gamma}[z1]\,\text{Gamma}[1+z1]\,\text{Gamma}[1+z1-z4]\,\text{Gamma}[1-z4]\,\text{Gamma}[-1+z4]\,\text{Gamma}[-1-z1+z4],\{\{\text{ep}\to 0\},\{z1\to -0.731822,\,z4\to 0.76808\}\}\Big],$$

$$\text{MBint}\Big[2\,x^{z1}\,\text{Gamma}[1-z1]\,\text{Gamma}[-z1]\,\text{Gamma}[z1]\,\text{Gamma}[1+z1]\,\text{Gamma}[1-z4]\,\text{Gamma}[1+z1-z4]\,\text{Gamma}[-1+z4]\,\text{Gamma}[-1-z1+z4],\{\{\text{ep}\to 0\},\{z1\to -0.547767,\,z4\to 0.832684\}\}\Big]\Big\}$$