In[ ]:=

```
Pr1[r_] := (0.0077320802909626556`
    (-0.81` + 4.083235210128391` Sqrt[1 - 2.` M] + 2.43` r^2 + 0.000013870453859833131`
      (((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3)
          M (1.35` - 6.805392016880652` Sqrt[1 - 2.` M] - 2.25` r^2)) /
        (0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3))^3.`
      (-0.1983721138549182` + 1.` Sqrt[1 - 2.` M] + 0.1983721138549182` r^2)
      (-0.1983721138549182` + 1.` Sqrt[1 - 2.` M] + 0.5951163415647547` r^2) +
     (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3) M
      (0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(1/3) (-0.8293524416135881` +
       4.180791470620436` Sqrt[1 - 2.` M] + 4.1467622080679405` r^2)))) /
   ((-0.1983721138549182` + 1.` Sqrt[1 - 2.` M] + 0.1983721138549182` r^2)
     (-0.1983721138549182` + 1.` Sqrt[1 - 2.` M] + 0.5951163415647547` r^2))

Pt1[r_] := (0.00018782032296468958`
   (1 - (2.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3) M r^2) /
     (0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3))
   (-11.809800000000005` r^2
     (0.3333333333333333` - 1.6803437078717656` Sqrt[1 - 2.` M] - 1.` r^2)^2
     (1.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3) M r^2 -
       0.5` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3))^2 +
    84.04815302530929` (0.1983721138549182` - 1.` Sqrt[1 - 2.` M] - 0.5951163415647547` r^2)^2
     (-0.1983721138549182` + 1.` Sqrt[1 - 2.` M] + 0.1983721138549182` r^2)
     (1.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3) M r^2 -
       0.5` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3))^2 +
    0.5` r^2 (0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^2
     (3.6` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3) M r^2 -
       1.8` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3) +
       (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3)
        M (0.07064755838641189` - 0.3561365406333312` Sqrt[1 - 2.` M] -
```

```
0.35323779193205945` r^2) - 6.1144694495604615`*^-6
((((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3) M
(1.35` - 6.805392016880652` Sqrt[1 - 2.` M] - 2.25` r^2))/
(0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3))^3.`
(0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3)
(-0.1983721138549182` + 1.` Sqrt[1 - 2.` M] + 0.1983721138549182` r^2))^2 +
0.2825902335456476` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3)
M r^2 (-2.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3) M r^2 +
(0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3))
(-11.673354586848513` (-0.1983721138549182` + 1.` Sqrt[1 - 2.` M])^3 -
20.8410122265403` (0.1983721138549182` - 1.` Sqrt[1 - 2.` M])^2 r^2 +
(2.095875` - 10.56537110620721` Sqrt[1 - 2.` M]) r^4 - 1.366875` r^6 +
23.346709173697025` (-0.1983721138549182` + 1.` Sqrt[1 - 2.` M])
(0.1983721138549182` - 1.` Sqrt[1 - 2.` M] - 0.5951163415647547` r^2)^2 -
0.003006278288724897` ((((-0.9000000000000001` - 2.2684640056268837`
Sqrt[1 - 2.` M])^(2/3) M (1.35` - 6.805392016880652` Sqrt[1 - 2.` M] - 2.25`
r^2))/(0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3))^2.`
(-0.1983721138549182` + 1.` Sqrt[1 - 2.` M] + 0.1983721138549182` r^2)^3) -
4.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3) M r^2
(0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)
(0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 0.45` r^2)^2 (6.1144694495604615`*^-6
((((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3)
M (1.35` - 6.805392016880652` Sqrt[1 - 2.` M] - 2.25` r^2))/
(0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3))^3.`
(0.45` - 2.2684640056268837` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3)
(-0.1983721138549182` + 1.` Sqrt[1 - 2.` M] + 0.1983721138549182` r^2) +
(-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` M])^(2/3) M
(-0.07064755838641189` + 0.3561365406333312` Sqrt[1 - 2.` M] +
0.35323779193205945` r^2)) -
```

$$
\begin{aligned}
&1.` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^2 \\
&\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 0.45` r^2\right) \\
&\left(-2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 + \right. \\
&\quad \left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right) \left(6.1144694495604615` *^-6 \right. \\
&\quad \left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3}\right.\right. \\
&\qquad \left.\left. M \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) \Big/ \right. \\
&\qquad \left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\right)^{3.`} \\
&\quad \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3} \\
&\quad \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` M} + 0.1983721138549182` r^2\right) + \\
&\quad \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M \\
&\quad \left(-0.07064755838641189` + 0.3561365406333312` \sqrt{1 - 2.` M} + \right. \\
&\qquad \left. 0.35323779193205945` r^2\right)\Big) + \\
&2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 \\
&\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right) \\
&\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 0.45` r^2\right)^2 \\
&\left(-3.6` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 + 1.8` \right. \\
&\quad \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3} + 6.1144694495604615` *^-6 \\
&\quad \left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3}\right.\right. \\
&\qquad \left.\left. M \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) \Big/ \right. \\
&\qquad \left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\right)^{3.`} \\
&\quad \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3} \\
&\quad \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` M} + 0.1983721138549182` r^2\right) + \\
&\quad \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M \\
&\quad \left(-0.07064755838641189` + 0.3561365406333312` \sqrt{1 - 2.` M} + \right. \\
&\qquad \left. 0.35323779193205945` r^2\right)\Big) - \\
&1.` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right) \\
&\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 0.45` r^2\right) \\
&\left(-2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 + \right. \\
&\quad \left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right) \\
&\left(20.583715779299066` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3}\right.
\end{aligned}
$$

$$M\left(0.1983721138549182` - 1.` \sqrt{1 - 2.` M} - 0.1983721138549182` r^2\right)^2 +$$
$$8.16647042025678` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` M} + 0.5951163415647547` r^2\right) \left(1.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 - 0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right) +$$
$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right) \left(6.1144694495604615` *^-6 \left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\right)^{3.`} \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3} \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` M} + 0.1983721138549182` r^2\right) + \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M \left(-0.07064755838641189` + 0.3561365406333312` \sqrt{1 - 2.` M} + 0.35323779193205945` r^2\right)\right)\right) \Big/$$
$$\left(\left(0.1983721138549182` - 1.` \sqrt{1 - 2.` M} - 0.5951163415647547` r^2\right)^2 \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` M} - 0.1983721138549182` r^2\right)^2 \left(1.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 - 0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right)^2\right)$$

$$\rho 1[r\_] := \left(0.07957747154594767` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` M}\right)^{2/3} M \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}$$

In[•]:=
$$Pr2[r\_] := \left(0.010751839448809199` \left(-0.81` + 3.4626706825649696` \sqrt{1 - 2.` M} + 2.43` r^2 + 8.051852388522243` *^-6 \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3} M \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\right)^{3.`} \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` M} + 0.2339234868849825` r^2\right) \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` M} + 0.7017704606549475` r^2\right) +$$

$$\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3} M$$
$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{1/3} \left(-0.8337139082933227` + 3.56404531838759` \sqrt{1 - 2.` M} + 4.1685695414666135` r^2\right)\Big)\Big) \Big/$$
$$\left(\left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` M} + 0.2339234868849825` r^2\right)\right.$$
$$\left.\left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` M} + 0.7017704606549475` r^2\right)\right)$$

$$\text{Pt2}[r\_] := \Bigg(0.00036317455583588634`$$

$$\left(1 - \frac{2.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3} M r^2}{\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}}\right)$$

$$\Bigg(-11.809800000000005` r^2$$

$$\left(0.3333333333333333` - 1.4249673590802343` \sqrt{1 - 2.` M} - 1.` r^2\right)^2$$
$$\left(1.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 - 0.5` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right)^2 +$$
$$51.25645319142468` \left(0.2339234868849825` - 1.` \sqrt{1 - 2.` M} - 0.7017704606549475` r^2\right)^2$$
$$\left(-0.23392348688498252` + 1.` \sqrt{1 - 2.` M} + 0.23392348688498252` r^2\right)$$
$$\left(1.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 - 0.5` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right)^2 +$$
$$0.5` r^2 \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^2$$
$$\left(3.6` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 - 1.8` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3} +\right.$$
$$\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3}$$
$$M \left(0.0662860917066772` - 0.2833665511290421` \sqrt{1 - 2.` M} - 0.33143045853338593` r^2\right) - 4.18559419245844` *^-6$$
$$\left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3} M \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\right)^{3.`}$$
$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}$$
$$\left.\left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` M} + 0.2339234868849825` r^2\right)\right)^2 +$$
$$0.26514436682670883` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3}$$

$$
\begin{aligned}
&M r^2 \left(-2.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1-2.` M}\right)^{2/3} M r^2 + \right.\\
&\quad \left.\left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 1.35` r^2\right)^{2/3}\right)\\
&\left(-7.118951832142317` \left(-0.2339234868849825` + 1.` \sqrt{1-2.` M}\right)^3 - \right.\\
&\quad 14.987610319868688` \left(0.2339234868849825` - 1.` \sqrt{1-2.` M}\right)^2 r^2 +\\
&\quad \left(2.0958750000000004` - 8.95966039113686` \sqrt{1-2.` M}\right) r^4 - 1.366875` r^6 +\\
&\quad 14.237903664284634` \left(-0.2339234868849825` + 1.` \sqrt{1-2.` M}\right)\\
&\quad \left(0.2339234868849825` - 1.` \sqrt{1-2.` M} - 0.7017704606549475` r^2\right)^2 -\\
&\quad 0.0015773056131510555` \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \right.\right.\right.\\
&\qquad \left.\left.\left.\sqrt{1-2.` M}\right)^{2/3} M \left(1.35` - 5.771117804274949` \sqrt{1-2.` M} - 2.25` \right.\right.\right.\\
&\qquad \left.\left.\left. r^2\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 1.35` r^2\right)^{5/3}\Big)^{2.`}\\
&\quad \left.\left(-0.2339234868849825` + 1.` \sqrt{1-2.` M} + 0.2339234868849825` r^2\right)^3\right) -\\
&4.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1-2.` M}\right)^{2/3} M r^2\\
&\left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 1.35` r^2\right)\\
&\left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 0.45` r^2\right)^2 \left(4.18559419245844`*^-6\right.\\
&\quad \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1-2.` M}\right)^{2/3}\right.\right.\\
&\qquad \left.\left. M \left(1.35` - 5.771117804274949` \sqrt{1-2.` M} - 2.25` r^2\right)\right) \Big/\right.\\
&\qquad \left.\left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 1.35` r^2\right)^{5/3}\right)^{3.`}\\
&\quad \left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 1.35` r^2\right)^{2/3}\\
&\quad \left(-0.2339234868849825` + 1.` \sqrt{1-2.` M} + 0.2339234868849825` r^2\right) +\\
&\quad \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1-2.` M}\right)^{2/3} M\\
&\quad \left(-0.0662860917066772` + 0.2833665511290421` \sqrt{1-2.` M} + \right.\\
&\qquad \left.0.33143045853338593` r^2\right)\Big) -\\
&1.` \left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 1.35` r^2\right)^2\\
&\left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 0.45` r^2\right)\\
&\left(-2.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1-2.` M}\right)^{2/3} M r^2 + \right.\\
&\quad \left.\left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 1.35` r^2\right)^{2/3}\right) \left(4.18559419245844`*^-6\right.\\
&\quad \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1-2.` M}\right)^{2/3}\right.\right.\\
&\qquad \left.\left. M \left(1.35` - 5.771117804274949` \sqrt{1-2.` M} - 2.25` r^2\right)\right) \Big/\right.\\
&\qquad \left.\left.\left(0.45` - 1.9237059347583163` \sqrt{1-2.` M} - 1.35` r^2\right)^{5/3}\right)^{3.`}\right)
\end{aligned}
$$

```
      (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3)
      (-0.2339234868849825` + 1.` Sqrt[1 - 2.` M] + 0.2339234868849825` r^2) +
     (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` M])^(2/3) M
      (-0.0662860917066772` + 0.2833665511290421` Sqrt[1 - 2.` M] +
        0.33143045853338593` r^2)) +
   2.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` M])^(2/3) M r^2
    (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 1.35` r^2)
    (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 0.45` r^2)^2
    (-3.6` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` M])^(2/3) M r^2 + 1.8`
       (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3) + 4.18559419245844`*^-6
       (((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` M])^(2/3)
            M (1.35` - 5.771117804274949` Sqrt[1 - 2.` M] - 2.25` r^2)))/
         (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3))^3.`
       (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3)
       (-0.2339234868849825` + 1.` Sqrt[1 - 2.` M] + 0.2339234868849825` r^2) +
      (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` M])^(2/3) M
       (-0.0662860917066772` + 0.2833665511290421` Sqrt[1 - 2.` M] +
         0.33143045853338593` r^2)) -
   1.` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 1.35` r^2)
    (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 0.45` r^2)
    (-2.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` M])^(2/3) M r^2 +
      (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3))
    (14.80257809369747` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` M])^(2/3)
       M (0.2339234868849825` - 1.` Sqrt[1 - 2.` M] - 0.2339234868849825` r^2)^2 +
      6.925341365129939` (-0.2339234868849825` + 1.` Sqrt[1 - 2.` M] + 0.7017704606549475`
          r^2) (1.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` M])^(2/3) M r^2 -
        0.5` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3)) +
      (0.45` - 1.9237059347583163` Sqrt[1 - 2.` M] - 1.35` r^2) (4.18559419245844`*^-6
         (((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` M])^(2/3)
              M (1.35` - 5.771117804274949` Sqrt[1 - 2.` M] - 2.25` r^2)))/
```

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\Big)^{3.`}$$
$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}$$
$$\left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` M} + 0.2339234868849825` r^2\right) +$$
$$\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3}$$
$$M\left(-0.0662860917066772` + 0.2833665511290421`\right.$$
$$\left.\sqrt{1 - 2.` M} + 0.33143045853338593` r^2\right)\Big)\Big)\Big)\Big/$$
$$\left(\left(0.2339234868849825` - 1.` \sqrt{1 - 2.` M} - 0.7017704606549475` r^2\right)^2\right.$$
$$\left(0.2339234868849825` - 1.` \sqrt{1 - 2.` M} - 0.2339234868849825` r^2\right)^2$$
$$\left(1.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 -\right.$$
$$\left.\left.0.5` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right)^2\right)$$

$\rho 2[r\_] :=$

$$\left(0.07957747154594767` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` M}\right)^{2/3}\right.$$
$$\left.M\left(1.35` - 5.771117804274949` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right)\Big/$$
$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}$$

In[•]:=

$$Pr3[r\_] := \left(2.1500044470142357` *^{-8} \left(-0.81` + 2448.6848606804633` \sqrt{1 - 2.` M} + 2.43` r^2 +\right.\right.$$
$$37.41479218732841` \left(\left(\left(-0.9000000000000002` - 1360.3804781558129` \sqrt{1 - 2.` M}\right)^{2/3}\right.\right.$$
$$\left.\left.M\left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right)\Big/\right.$$
$$\left.\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\right)^{3.`}$$
$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` M} + 0.00033078981007580934` r^2\right)$$
$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` M} + 0.000992369430227428` r^2\right) +$$
$$\left(-0.9000000000000002` - 1360.3804781558129` \sqrt{1 - 2.` M}\right)^{2/3} M$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{1/3} \left(-0.7716214767977709` +\right.$$
$$\left.\left.2332.6639856921024` \sqrt{1 - 2.` M} + 3.858107383988855` r^2\right)\right)\Big)\Big/$$
$$\left(\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` M} + 0.00033078981007580934` r^2\right)\right.$$
$$\left.\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` M} + 0.000992369430227428` r^2\right)\right)$$

$$Pt3[r\_] := \left(1.4522072115322137` *^{-15}\right.$$

$$\left(1-\frac{2.`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,M}\right)^{2/3}M\,r^2}{\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,M}-1.35`\,r^2\right)^{2/3}}\right)$$

$$\left(-11.809800000000003`\,r^2\right.$$

$$\left(0.3333333333333333`-1007.6892430783798`\sqrt{1-2.`\,M}-1.`\,r^2\right)^2$$

$$\left(1.`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,M}\right)^{2/3}M\,r^2-0.5`\left(0.45`-\right.\right.$$

$$\left.\left.1360.3804781558129`\sqrt{1-2.`\,M}-1.35`\,r^2\right)^{2/3}\right)^2+1.8126488072747894`*^10$$

$$\left(0.00033078981007580934`-1.`\sqrt{1-2.`\,M}-0.000992369430227428`\,r^2\right)^2$$

$$\left(-0.00033078981007580934`+1.`\sqrt{1-2.`\,M}+0.00033078981007580934`\,r^2\right)$$

$$\left(1.`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,M}\right)^{2/3}M\,r^2-\right.$$

$$\left.0.5`\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,M}-1.35`\,r^2\right)^{2/3}\right)^2+$$

$$0.5`\,r^2\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,M}-1.35`\,r^2\right)^2$$

$$\left(3.6`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,M}\right)^{2/3}M\,r^2-\right.$$

$$1.8`\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,M}-1.35`\,r^2\right)^{2/3}+$$

$$\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,M}\right)^{2/3}$$

$$M\left(0.12837852320222917`-388.09697061952363`\sqrt{1-2.`\,M}-\right.$$

$$\left.0.6418926160111459`\,r^2\right)-0.02750318222593831`$$

$$\left(\left(\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,M}\right)^{2/3}M\right.\right.$$

$$\left.\left(1.35`-4081.1414344674386`\sqrt{1-2.`\,M}-2.25`\,r^2\right)\right)\Big/$$

$$\left.\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,M}-1.35`\,r^2\right)^{5/3}\right)^{3.`}$$

$$\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,M}-1.35`\,r^2\right)^{2/3}$$

$$\left.\left(-0.00033078981007580934`+1.`\sqrt{1-2.`\,M}+0.00033078981007580934`\,r^2\right)\right)^2+$$

$$0.5135140928089168`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,M}\right)^{2/3}$$

$$M\,r^2\left(-2.`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,M}\right)^{2/3}M\,r^2+\right.$$

$$\left.\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,M}-1.35`\,r^2\right)^{2/3}\right)$$

$$\left(-2.517567787881653`*^9\left(-0.00033078981007580934`+1.`\sqrt{1-2.`\,M}\right)^3-\right.$$

$$7.495071933657125`*^6\left(0.00033078981007580934`-1.`\sqrt{1-2.`\,M}\right)^2r^2+$$

$$\left(2.0958750000000004`-6335.972077010699`\sqrt{1-2.`\,M}\right)r^4-1.366875`\,r^6+$$

$$5.035135575763303`*^9\left(-0.00033078981007580934`+1.`\sqrt{1-2.`\,M}\right)$$

$$\left(0.00033078981007580934`-1.`\sqrt{1-2.`\,M}-0.000992369430227428`\,r^2\right)^2-$$

```
2.676178798525445`*^6 ((((-0.9000000000000001` - 1360.3804781558129`
                  Sqrt[1 - 2.` M])^(2/3) M (1.35` - 4081.1414344674386` Sqrt[1 - 2.` M] - 2.25`
                  r^2))) / (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3))^2.`
     (-0.00033078981007580934` + 1.` Sqrt[1 - 2.` M] + 0.00033078981007580934` r^2)^3) -
4.` (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` M])^(2/3) M r^2
  (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 1.35` r^2)
  (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 0.45` r^2)^2 (0.02750318222593831`
     ((((-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` M])^(2/3)
          M (1.35` - 4081.1414344674386` Sqrt[1 - 2.` M] - 2.25` r^2))) /
        (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3))^3.`
     (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3)
     (-0.00033078981007580934` + 1.` Sqrt[1 - 2.` M] + 0.00033078981007580934` r^2) +
    (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` M])^(2/3) M
     (-0.12837852320222917` + 388.09697061952363` Sqrt[1 - 2.` M] +
       0.6418926160111459` r^2)) -
1.` (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 1.35` r^2)^2
  (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 0.45` r^2)
  (-2.` (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` M])^(2/3) M r^2 +
    (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3)) (0.02750318222593831`
     ((((-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` M])^(2/3)
          M (1.35` - 4081.1414344674386` Sqrt[1 - 2.` M] - 2.25` r^2))) /
        (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3))^3.`
     (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3)
     (-0.00033078981007580934` + 1.` Sqrt[1 - 2.` M] + 0.00033078981007580934` r^2) +
    (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` M])^(2/3) M
     (-0.12837852320222917` + 388.09697061952363` Sqrt[1 - 2.` M] +
       0.6418926160111459` r^2)) +
2.` (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` M])^(2/3) M r^2
  (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 1.35` r^2)
  (0.45` - 1360.3804781558129` Sqrt[1 - 2.` M] - 0.45` r^2)^2
```

$$\Bigg(-3.6` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1-2.` M}\right)^{2/3} M r^2 + 1.8` \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 1.35` r^2\right)^{2/3} + 0.02750318222593831` \Bigg(\Bigg(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1-2.` M}\right)^{2/3} M \left(1.35` - 4081.1414344674386` \sqrt{1-2.` M} - 2.25` r^2\right)\Bigg) \Big/ \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 1.35` r^2\right)^{5/3}\Bigg)^{3.`} \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 1.35` r^2\right)^{2/3} \left(-0.00033078981007580934` + 1.` \sqrt{1-2.` M} + 0.00033078981007580934` r^2\right) + \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1-2.` M}\right)^{2/3} M \left(-0.12837852320222917` + 388.09697061952363` \sqrt{1-2.` M} + 0.6418926160111459` r^2\right)\Bigg) -$$

$$1.` \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 1.35` r^2\right) \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 0.45` r^2\right) \Bigg(-2.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1-2.` M}\right)^{2/3} M r^2 + \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 1.35` r^2\right)^{2/3}\Bigg) \Bigg(7.402540181389752`*^6 \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1-2.` M}\right)^{2/3} M \left(0.00033078981007580934` - 1.` \sqrt{1-2.` M} - 0.00033078981007580934` r^2\right)^2 + 4897.369721360927` \left(-0.00033078981007580934` + 1.` \sqrt{1-2.` M} + 0.000992369430227428` r^2\right) \Bigg(1.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1-2.` M}\right)^{2/3} M r^2 - 0.5` \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 1.35` r^2\right)^{2/3}\Bigg) + \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 1.35` r^2\right) \Bigg(0.02750318222593831` \Bigg(\Bigg(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1-2.` M}\right)^{2/3} M \left(1.35` - 4081.1414344674386` \sqrt{1-2.` M} - 2.25` r^2\right)\Bigg) \Big/ \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 1.35` r^2\right)^{5/3}\Bigg)^{3.`} \left(0.45` - 1360.3804781558129` \sqrt{1-2.` M} - 1.35` r^2\right)^{2/3} \left(-0.00033078981007580934` + 1.` \sqrt{1-2.` M} + 0.00033078981007580934` r^2\right) + \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1-2.` M}\right)^{2/3} M \left(-0.12837852320222917` + 388.09697061952363` \sqrt{1-2.` M} + 0.6418926160111459` r^2\right)\Bigg)\Bigg) \Big/$$

$$\left(\left(0.00033078981007580934` - 1.` \sqrt{1 - 2.` M} - 0.000992369430227428` r^2\right)^2 \left(0.00033078981007580934` - 1.` \sqrt{1 - 2.` M} - 0.00033078981007580934` r^2\right)^2 \left(1.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 - 0.5` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right)^2\right)$$

$$\rho 3[r\_] := \left(0.07957747154594767` \left(-0.9000000000000002` - 1360.3804781558129` \sqrt{1 - 2.` M}\right)^{2/3} M \left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) \Big/ \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}$$

In[ ]:=

$$Pr4[r\_] := \left(0.0017545160802817416` \left(-0.81` + 8.571836897266643` \sqrt{1 - 2.` M} + 2.43` r^2 + 0.00011232936844855853` \left(\left(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M \left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) \Big/ \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\right)^{3.`} \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M} + 0.09449549842208152` r^2\right) \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M} + 0.2834864952662446` r^2\right) + \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{1/3} \left(-0.8153481128767929` + 8.628433380338295` \sqrt{1 - 2.` M} + 4.0767405643839645` r^2\right)\right)\right) \Big/ \left(\left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M} + 0.09449549842208152` r^2\right) \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M} + 0.2834864952662446` r^2\right)\right)$$

$$Pt4[r\_] := \left(9.670848470568061`*^-6 \left(1 - \frac{2.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M r^2}{\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}}\right) \left(-146.95277558668357` r^2 \left(0.09449549842208152` - 1.` \sqrt{1 - 2.` M} - 0.2834864952662446` r^2\right)^2 \left(1.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 - 0.5` \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right)^2 + 777.5649530430114`\right.$$

$$\left(0.09449549842208152` - 1.` \sqrt{1 - 2.` M} - 0.2834864952662446` r^2\right)^2$$
$$\left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M} + 0.09449549842208152` r^2\right)$$
$$\left(1.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 - \right.$$
$$\left. 0.5` \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right)^2 +$$
$$0.338607548492829` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3}$$
$$M r^2 \left(-2.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 + \right.$$
$$\left. \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3}\right)$$
$$\left(-107.99513236708495` \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M}\right)^3 - \right.$$
$$91.84548474167725` \left(0.09449549842208152` - 1.` \sqrt{1 - 2.` M}\right)^2 r^2 -$$
$$22.179627971677437` \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M}\right) r^4 -$$
$$1.366875` r^6 + 215.9902647341699` \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M}\right)$$
$$\left(0.09449549842208152` - 1.` \sqrt{1 - 2.` M} - 0.2834864952662446` r^2\right)^2 -$$
$$0.04265420378546604`$$
$$\left(\left(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M \right.\right.$$
$$\left.\left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) /$$
$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\Big)^{2.`}$$
$$\left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M} + 0.09449549842208152` r^2\right)^3\Big) +$$
$$0.5` r^2 \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^2$$
$$\left(3.6` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M r^2 - 1.8` \left(0.45` - \right.\right.$$
$$\left.\left. 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3} - 0.000023588043686631503`$$
$$\left(\left(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M \right.\right.$$
$$\left.\left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` M} - 2.25` r^2\right)\right) /$$
$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{5/3}\Big)^{3.`}$$
$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)^{2/3} \left(-0.09449549842208152` + \right.$$
$$\left. 1.` \sqrt{1 - 2.` M} + 0.09449549842208152` r^2\right) - 0.8958298388468625`$$
$$\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M$$
$$\left.\left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` M} + 0.47247749211040757` r^2\right)\right)^2 -$$
$$4.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` M}\right)^{2/3} M r^2$$
$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 1.35` r^2\right)$$
$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` M} - 0.45` r^2\right)^2$$

$$\Big(0.000023588043686631503`\Big(\Big(\Big(-0.9000000000000001`-4.762131609592578`\sqrt{1-2.`\,M}\Big)^{2/3}M\Big(1.3499999999999999`-14.286394828777734`\sqrt{1-2.`\,M}-2.25`\,r^2\Big)\Big)\Big/\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)^{5/3}\Big)^{3.`}\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)^{2/3}\Big(-0.09449549842208152`+1.`\sqrt{1-2.`\,M}+0.09449549842208152`\,r^2\Big)+0.8958298388468625`\Big(-0.9000000000000001`-4.762131609592578`\sqrt{1-2.`\,M}\Big)^{2/3}M\Big(-0.09449549842208152`+1.`\sqrt{1-2.`\,M}+0.47247749211040757`\,r^2\Big)\Big)-1.`\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)^2\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-0.45`\,r^2\Big)\Big(-2.`\Big(-0.9000000000000001`-4.762131609592578`\sqrt{1-2.`\,M}\Big)^{2/3}M\,r^2+\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)^{2/3}\Big)\Big(0.000023588043686631503`\Big(\Big(\Big(-0.9000000000000001`-4.762131609592578`\sqrt{1-2.`\,M}\Big)^{2/3}M\Big(1.3499999999999999`-14.286394828777734`\sqrt{1-2.`\,M}-2.25`\,r^2\Big)\Big)\Big/\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)^{5/3}\Big)^{3.`}\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)^{2/3}\Big(-0.09449549842208152`+1.`\sqrt{1-2.`\,M}+0.09449549842208152`\,r^2\Big)+0.8958298388468625`\Big(-0.9000000000000001`-4.762131609592578`\sqrt{1-2.`\,M}\Big)^{2/3}M\Big(-0.09449549842208152`+1.`\sqrt{1-2.`\,M}+0.47247749211040757`\,r^2\Big)\Big)+2.`\Big(-0.9000000000000001`-4.762131609592578`\sqrt{1-2.`\,M}\Big)^{2/3}M\,r^2\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-0.45`\,r^2\Big)^2\Big(-3.6`\Big(-0.9000000000000001`-4.762131609592578`\sqrt{1-2.`\,M}\Big)^{2/3}M\,r^2+1.8`\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)^{2/3}+0.000023588043686631503`\Big(\Big(\Big(-0.9000000000000001`-4.762131609592578`\sqrt{1-2.`\,M}\Big)^{2/3}M\Big(1.3499999999999999`-14.286394828777734`\sqrt{1-2.`\,M}-2.25`\,r^2\Big)\Big)\Big/\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)^{5/3}\Big)^{3.`}\Big(0.45`-4.762131609592578`\sqrt{1-2.`\,M}-1.35`\,r^2\Big)^{2/3}\Big(-0.09449549842208152`+1.`\sqrt{1-2.`\,M}+0.09449549842208152`\,r^2\Big)+$$

```
0.8958298388468625` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` M])^(2/3)
     M (-0.09449549842208152` + 1.` Sqrt[1 - 2.` M] + 0.47247749211040757` r^2)) -
  1.` (0.45` - 4.762131609592578` Sqrt[1 - 2.` M] - 1.35` r^2)
   (0.45` - 4.762131609592578` Sqrt[1 - 2.` M] - 0.45` r^2)
   (-2.` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` M])^(2/3) M r^2 +
     (0.45` - 4.762131609592578` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3))
   (90.7115898683232` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` M])^(2/3)
     M (0.09449549842208152` - 1.` Sqrt[1 - 2.` M] - 0.09449549842208152` r^2)^2 +
    17.14367379453328` (-0.09449549842208152` +
      1.` Sqrt[1 - 2.` M] + 0.2834864952662446` r^2)
     (1.` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` M])^(2/3) M r^2 -
      0.5` (0.45` - 4.762131609592578` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3)) +
    (0.45` - 4.762131609592578` Sqrt[1 - 2.` M] - 1.35` r^2) (0.000023588043686631503`
       (((-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` M])^(2/3) M
           (1.3499999999999999` - 14.286394828777734` Sqrt[1 - 2.` M] - 2.25` r^2))/
         (0.45` - 4.762131609592578` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3))^3.` (0.45` -
        4.762131609592578` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3) (-0.09449549842208152` +
       1.` Sqrt[1 - 2.` M] + 0.09449549842208152` r^2) + 0.8958298388468625`
       (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` M])^(2/3) M
       (-0.09449549842208152` + 1.` Sqrt[1 - 2.` M] + 0.47247749211040757` r^2))))/
  ((0.09449549842208152` - 1.` Sqrt[1 - 2.` M] - 0.2834864952662446` r^2)^2
    (0.09449549842208152` - 1.` Sqrt[1 - 2.` M] - 0.09449549842208152` r^2)^2
    (1.` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` M])^(2/3) M r^2 -
      0.5` (0.45` - 4.762131609592578` Sqrt[1 - 2.` M] - 1.35` r^2)^(2/3))^2)
ρ4[r_] :=
 (0.07957747154594767` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` M])^(2/3) M
    (1.3499999999999999` - 14.286394828777734` Sqrt[1 - 2.` M] - 2.25` r^2))/
  (0.45` - 4.762131609592578` Sqrt[1 - 2.` M] - 1.35` r^2)^(5/3)
```

Sector material

Presión Radial

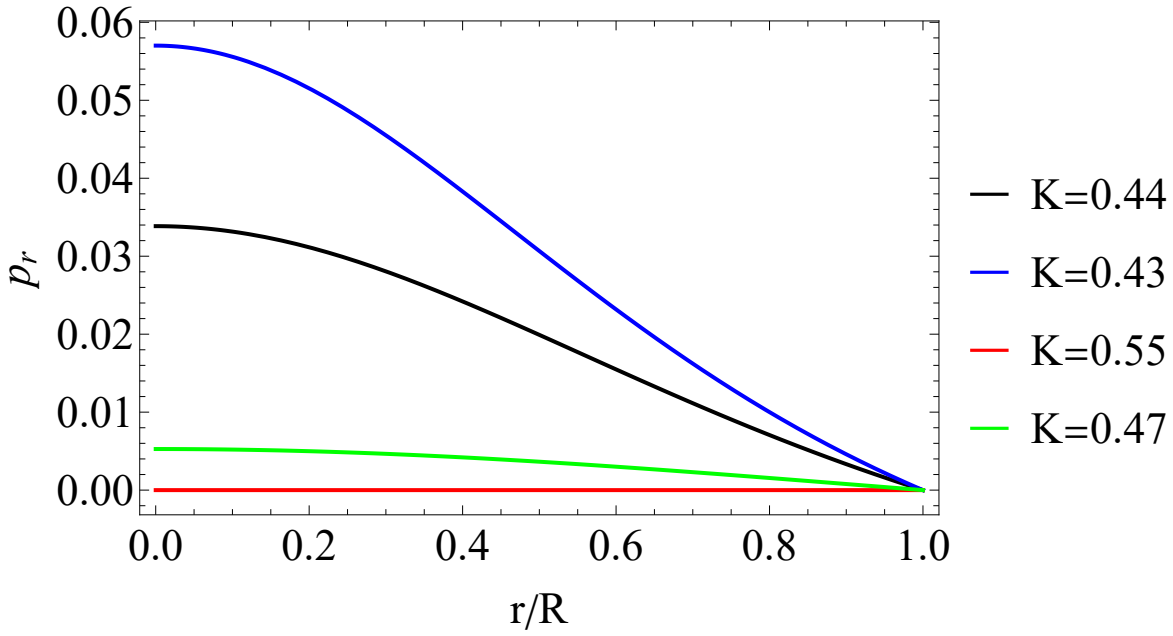
In[ ]:=
```
Prg1[x_] := (0.0077320802909626556`
    (-0.81` + 4.083235210128391` Sqrt[1 - 2.` u] + 2.43` x^2 + 0.000013870453859833131`
      (((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
          u (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25` x^2)) /
        (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
      (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.1983721138549182` x^2)
      (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.5951163415647547` x^2) +
     (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
      (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(1/3) (-0.8293524416135881` +
       4.180791470620436` Sqrt[1 - 2.` u] + 4.1467622080679405` x^2))) /
   ((-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.1983721138549182` x^2)
     (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.5951163415647547` x^2)))
Prg2[x_] := (0.010751839448809199`
    (-0.81` + 3.4626706825649696` Sqrt[1 - 2.` u] + 2.43` x^2 + 8.051852388522243`*^-6
      (((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3)
          u (1.35` - 5.771117804274949` Sqrt[1 - 2.` u] - 2.25` x^2)) /
        (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
      (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.2339234868849825` x^2)
      (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.7017704606549475` x^2) +
     (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
      (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(1/3) (-0.8337139082933227` +
       3.56404531838759` Sqrt[1 - 2.` u] + 4.1685695414666135` x^2))) /
   ((-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.2339234868849825` x^2)
     (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.7017704606549475` x^2)))
Prg3[x_] := (2.1500044470142357`*^-8 (-0.81` + 2448.6848606804633` Sqrt[1 - 2.` u] + 2.43` x^2 +
```

$$37.41479218732841` \left(\left(\left(-0.9000000000000002` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.00033078981007580934` x^2\right) \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.000992369430227428` x^2\right) + \left(-0.9000000000000002` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{1/3} \left(-0.7716214767977709` + 2332.6639856921024` \sqrt{1 - 2.` u} + 3.858107383988855` x^2\right)\right) \Big/ \left(\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.00033078981007580934` x^2\right) \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.000992369430227428` x^2\right)\right)$$

$$\text{Prg4}[x\_] := \left(0.0017545160802817416` \left(-0.81` + 8.571836897266643` \sqrt{1 - 2.` u} + 2.43` x^2 + 0.00011232936844855853` \left(\left(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.09449549842208152` x^2\right) \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.2834864952662446` x^2\right) + \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{1/3} \left(-0.8153481128767929` + 8.628433380338295` \sqrt{1 - 2.` u} + 4.0767405643839645` x^2\right)\right) \Big/ \left(\left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.09449549842208152` x^2\right) \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.2834864952662446` x^2\right)\right)$$

```
In[ ]:= solu1 := Re[Prg1[x]] /. {u → 0.302917356305}
        parte real
        solu2 := Re[Prg2[x]] /. {u → 0.3340789749418907}
        parte real
        solu3 := Re[Prg3[x]] /. {u → 0.0007712244935388194`}
        parte real
        solu4 := Re[Prg4[x]] /. {u → 0.17642618727114115`}
        parte real
        Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
        representación gráfica                                evaluado  verdadero
         PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
        estilo de represe··  negro  grosor                    azul  grosor
           }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
               rojo  grosor                verde  grosor                rosa  grosor
         Frame → True, FrameLabel → {"r/R", "pr"}, ImageSize → 500,
        marco  verd···  etiqueta de marco                tamaño de imagen
         LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
        estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
         PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
        rango de rep···  comp···  leyendas de representación
```

Out[ ]=



Presión Tangencial

```
In[ ]:= Ptg1[x_] := (0.00018782032296468958`
        (1 - (2.` (-0.9000000000000001` - 2.2684640056268837` √(1 - 2.` u))^(2/3) u x^2)) /
          (0.45` - 2.2684640056268837` √(1 - 2.` u) - 1.35` x^2)^(2/3)) (-33.34561956246449`
        x^2 (0.1983721138549182` - 1.` √(1 - 2.` u) - 0.5951163415647547` x^2)^2
        (1.` (-0.9000000000000001` - 2.2684640056268837` √(1 - 2.` u))^(2/3) u x^2 -
```

$$0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\Big)^2 +$$
$$84.04815302530929` \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.5951163415647547` x^2\right)^2$$
$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right)$$
$$\left(1.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 -$$
$$0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\Big)^2 +$$
$$0.2825902335456476` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u x^2 \left(-2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 +$$
$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\Big)$$
$$\left(-11.673354586848513` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u}\right)^3 -$$
$$20.8410122265403` \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u}\right)^2 x^2 -$$
$$10.56537110620721` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u}\right) x^4 -$$
$$1.366875` x^6 + 23.346709173697025` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u}\right)$$
$$\left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.5951163415647547` x^2\right)^2 -$$
$$0.003006278288724897` \left(\left(\left(-0.9000000000000001` - 2.2684640056268837`\right.\right.\right.$$
$$\left.\left.\left.\sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25`\right.\right.\right.$$
$$\left.\left.\left. x^2\right)\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\Big)^{2.`}$$
$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right)^3\Big) +$$
$$0.5` x^2 \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^2$$
$$\left(3.6` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 -$$
$$1.8` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} -$$
$$6.1144694495604615`*^-6 \left(\left(\left(-0.9000000000000001` - 2.2684640056268837`\right.\right.\right.$$
$$\left.\left.\left.\sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25`\right.\right.\right.$$
$$\left.\left.\left. x^2\right)\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`}$$
$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.1983721138549182` +$$
$$1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right) - 0.3561365406333312`$$
$$\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` x^2\right)\Big)^2 -$$
$$4.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2$$
$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 0.45` x^2\right)^2$$

$$\left(6.1144694495604615` *^-6 \right.$$

$$\left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}\right.\right.$$

$$\left.\left.u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/$$

$$\left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`}$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}$$

$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right) +$$

$$0.3561365406333312` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}$$

$$\left.u \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` x^2\right)\right) -$$

$$1.` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^2$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 0.45` x^2\right)$$

$$\left(-2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 + \right.$$

$$\left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right) \left(6.1144694495604615` *^-6 \right.$$

$$\left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}\right.\right.$$

$$\left.\left.u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/$$

$$\left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`}$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}$$

$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right) +$$

$$0.3561365406333312` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}$$

$$\left.u \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` x^2\right)\right) +$$

$$2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 0.45` x^2\right)^2$$

$$\left(-3.6` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 + 1.8` \right.$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} + 6.1144694495604615` *^-6$$

$$\left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}\right.\right.$$

$$\left.\left.u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/$$

$$\left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`}$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}$$

```
        (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.1983721138549182` x^2) +
       0.3561365406333312` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
        u (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.9918605692745911` x^2)) -
     1.` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)
      (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 0.45` x^2)
      (-2.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u x^2 +
        (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3))
      (20.583715779299066` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
        u (0.1983721138549182` - 1.` Sqrt[1 - 2.` u] - 0.1983721138549182` x^2)^2 +
       8.166470420256780` (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.5951163415647547`
           x^2) (1.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u x^2 -
         0.5` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)) +
       (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2) (6.1144694495604615`*^-6
          (((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
              u (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25` x^2)) /
            (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
           (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
           (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.1983721138549182` x^2) +
          0.3561365406333312` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
          (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.9918605692745911` x^2)))))) /
   ((0.1983721138549182` - 1.` Sqrt[1 - 2.` u] - 0.5951163415647547` x^2)^2
     (0.1983721138549182` - 1.` Sqrt[1 - 2.` u] - 0.1983721138549182` x^2)^2
     (1.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u x^2 -
       0.5` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3))^2)

Ptg2[x_] := (0.00018782032296468958`
    (1 - (2.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u x^2) /
      (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)) (-33.34561956246449`
      x^2 (0.1983721138549182` - 1.` Sqrt[1 - 2.` u] - 0.5951163415647547` x^2)^2
```

$$\left(1.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 - 0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right)^2 + 84.04815302530929` \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.5951163415647547` x^2\right)^2 \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right) \left(1.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 - 0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right)^2 + 0.2825902335456476` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 \left(-2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 + \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right) \left(-11.673354586848513` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u}\right)^3 - 20.8410122265403` \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u}\right)^2 x^2 - 10.56537110620721` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u}\right) x^4 - 1.366875` x^6 + 23.346709173697025` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u}\right) \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.5951163415647547` x^2\right)^2 - 0.0030062782288724897` \left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{2.`} \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right)^3\right) + 0.5` x^2 \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^2 \left(3.6` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 - 1.8` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} - 6.1144694495604615`*^-6 \left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right) - 0.3561365406333312` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` x^2\right)\right)^2 - 4.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 0.45` x^2\right)^2$$

$$\left(6.1144694495604615` *^-6 \left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right) + 0.3561365406333312` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` x^2\right)\right) -$$

$$1.` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^2 \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 0.45` x^2\right) \left(-2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 + \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right) \left(6.1144694495604615` *^-6 \left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right) + 0.3561365406333312` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` x^2\right)\right) +$$

$$2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right) \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 0.45` x^2\right)^2 \left(-3.6` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 + 1.8` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} + 6.1144694495604615` *^-6 \left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`}\right)$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}$$
$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right) +$$
$$0.3561365406333312` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` x^2\right)\Big) -$$
$$1.` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)$$
$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 0.45` x^2\right)$$
$$\left(-2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 +\right.$$
$$\left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right)$$
$$\left(20.583715779299066` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}\right.$$
$$u \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.1983721138549182` x^2\right)^2 +$$
$$8.16647042025678` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.5951163415647547`\right.$$
$$\left.x^2\right) \left(1.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 -\right.$$
$$\left.0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right) +$$
$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right) \left(6.1144694495604615` *^-6\right.$$
$$\left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}\right.\right.$$
$$\left.\left.u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/\right.$$
$$\left.\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(0.45` -\right.$$
$$\left.2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.1983721138549182` +\right.$$
$$\left.1.` \sqrt{1 - 2.` u} + 0.1983721138549182` x^2\right) + 0.3561365406333312`$$
$$\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left.\left.\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` x^2\right)\right)\right)\Big)\Big/$$
$$\left(\left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.5951163415647547` x^2\right)^2\right.$$
$$\left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.1983721138549182` x^2\right)^2$$
$$\left(1.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 -\right.$$
$$\left.\left.0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right)^2\right)$$

$$\text{Ptg3}[x\_] := \left(1.4522072115322137` *^-15\right.$$

$$\left(1 - \frac{2.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u x^2}{\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}}\right)$$

$$\Bigg(-1.19921150938514`*^7\,x^2$$
$$\left(0.00033078981007580934` - 1.`\sqrt{1-2.`\,u} - 0.000992369430227428`\,x^2\right)^2$$
$$\left(1.`\left(-0.9000000000000001` - 1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\,x^2 - 0.5`\left(0.45` - 1360.3804781558129`\sqrt{1-2.`\,u} - 1.35`\,x^2\right)^{2/3}\right)^2 + 1.8126488072747894`*^10$$
$$\left(0.00033078981007580934` - 1.`\sqrt{1-2.`\,u} - 0.000992369430227428`\,x^2\right)^2$$
$$\left(-0.00033078981007580934` + 1.`\sqrt{1-2.`\,u} + 0.00033078981007580934`\,x^2\right)$$
$$\left(1.`\left(-0.9000000000000001` - 1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\,x^2 - 0.5`\left(0.45` - 1360.3804781558129`\sqrt{1-2.`\,u} - 1.35`\,x^2\right)^{2/3}\right)^2 +$$
$$0.5135140928089168`\left(-0.9000000000000001` - 1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\,x^2\left(-2.`\left(-0.9000000000000001` - 1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\,x^2 + \left(0.45` - 1360.3804781558129`\sqrt{1-2.`\,u} - 1.35`\,x^2\right)^{2/3}\right)$$
$$\Bigg(-2.517567787881653`*^9\left(-0.00033078981007580934` + 1.`\sqrt{1-2.`\,u}\right)^3 - 7.495071933657125`*^6\left(0.00033078981007580934` - 1.`\sqrt{1-2.`\,u}\right)^2x^2 - 6335.972077010699`\left(-0.00033078981007580934` + 1.`\sqrt{1-2.`\,u}\right)x^4 - 1.366875`\,x^6 + 5.035135575763303`*^9\left(-0.00033078981007580934` + 1.`\sqrt{1-2.`\,u}\right)\left(0.00033078981007580934` - 1.`\sqrt{1-2.`\,u} - 0.000992369430227428`\,x^2\right)^2 - 2.676178798525445`*^6\Bigg(\Bigg(\Big(-0.9000000000000001` - 1360.3804781558129`\sqrt{1-2.`\,u}\Big)^{2/3}u\left(1.35` - 4081.1414344674386`\sqrt{1-2.`\,u} - 2.25`\,x^2\right)\Bigg)\Big/\left(0.45` - 1360.3804781558129`\sqrt{1-2.`\,u} - 1.35`\,x^2\right)^{5/3}\Bigg)^{2.`}\left(-0.00033078981007580934` + 1.`\sqrt{1-2.`\,u} + 0.00033078981007580934`\,x^2\right)^3\Bigg) + 0.5`\,x^2\left(0.45` - 1360.3804781558129`\sqrt{1-2.`\,u} - 1.35`\,x^2\right)^2\Bigg(3.6`\left(-0.9000000000000001` - 1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\,x^2 - 1.8`\left(0.45` - 1360.3804781558129`\sqrt{1-2.`\,u} - 1.35`\,x^2\right)^{2/3} - 0.02750318222593831`\Bigg(\Bigg(\Big(-0.9000000000000001` - 1360.3804781558129`\sqrt{1-2.`\,u}\Big)^{2/3}u\left(1.35` - 4081.1414344674386`\sqrt{1-2.`\,u} - 2.25`\,x^2\right)\Bigg)\Big/\left(0.45` - 1360.3804781558129`\sqrt{1-2.`\,u} - 1.35`\,x^2\right)^{5/3}\Bigg)^{3.`}\left(0.45` - 1360.3804781558129`\sqrt{1-2.`\,u} - 1.35`\,x^2\right)^{2/3}\left(-0.00033078981007580934` + 1.`\sqrt{1-2.`\,u} + 0.00033078981007580934`\,x^2\right) - 388.09697061952363`\left(-0.9000000000000001` - 1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u$$

$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.0016539490503790467` x^2\right)\Big)^2 -$$

$$4.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u x^2$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 0.45` x^2\right)^2 \left(0.02750318222593831`\right.$$

$$\left(\left(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}\right.\right.$$

$$\left.\left.u \left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`}$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}$$

$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.00033078981007580934` x^2\right) +$$

$$388.09697061952363` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}$$

$$u \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.0016539490503790467` x^2\right)\Big) -$$

$$1.` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^2$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 0.45` x^2\right)$$

$$\left(-2.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 +\right.$$

$$\left.\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right) \left(0.02750318222593831`\right.$$

$$\left(\left(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}\right.\right.$$

$$\left.\left.u \left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`}$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}$$

$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.00033078981007580934` x^2\right) +$$

$$388.09697061952363` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}$$

$$u \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.0016539490503790467` x^2\right)\Big) +$$

$$2.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u x^2$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 0.45` x^2\right)^2$$

$$\left(-3.6` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 +\right.$$

$$1.8` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} + 0.02750318222593831`$$

$$\left(\left(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}\right.\right.$$

$$\left.\left.u \left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`}$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}$$
$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.00033078981007580934` x^2\right) +$$
$$388.09697061952363` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.0016539490503790467` x^2\right)\Big) -$$
$$1.` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 0.45` x^2\right)$$
$$\Big(-2.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 +$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\Big)$$
$$\Big(7.402540181389752`*^6 \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(0.00033078981007580934` - 1.` \sqrt{1 - 2.` u} - 0.00033078981007580934` x^2\right)^2 +$$
$$4897.369721360927` \left(-0.00033078981007580934` +$$
$$1.` \sqrt{1 - 2.` u} + 0.000992369430227428` x^2\right)$$
$$\Big(1.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 -$$
$$0.5` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\Big) +$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right) \Big(0.02750318222593831`$$
$$\Big(\Big(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` u} - 2.25` x^2\right)\Big) \Big/$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`}$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}$$
$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.00033078981007580934` x^2\right) +$$
$$388.09697061952363` \Big(-0.9000000000000001` - 1360.3804781558129`$$
$$\sqrt{1 - 2.` u}\Big)^{2/3} u \Big(-0.00033078981007580934` + 1.`$$
$$\sqrt{1 - 2.` u} + 0.0016539490503790467` x^2\Big)\Big)\Big)\Big) \Big/$$
$$\Big(\left(0.00033078981007580934` - 1.` \sqrt{1 - 2.` u} - 0.000992369430227428` x^2\right)^2$$
$$\left(0.00033078981007580934` - 1.` \sqrt{1 - 2.` u} - 0.00033078981007580934` x^2\right)^2$$
$$\Big(1.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 -$$
$$0.5` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\Big)^2\Big)$$

```
Ptg4[x_] := (9.670848470568061`*^-6

(1 - (2.` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3) u x^2)/
     (0.45` - 4.762131609592578` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3))

(-146.95277558668357` x^2
   (0.09449549842208152` - 1.` Sqrt[1 - 2.` u] - 0.2834864952662446` x^2)^2
   (1.` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3) u x^2 - 0.5`
      (0.45` - 4.762131609592578` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3))^2 + 777.5649530430114`
   (0.09449549842208152` - 1.` Sqrt[1 - 2.` u] - 0.2834864952662446` x^2)^2
   (-0.09449549842208152` + 1.` Sqrt[1 - 2.` u] + 0.09449549842208152` x^2)
   (1.` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3) u x^2 -
     0.5` (0.45` - 4.762131609592578` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3))^2 +
  0.338607548492829` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3)
   u x^2 (-2.` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3) u x^2 +
     (0.45` - 4.762131609592578` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3))
   (-107.99513236708495` (-0.09449549842208152` + 1.` Sqrt[1 - 2.` u])^3 -
     91.84548474167725` (0.09449549842208152` - 1.` Sqrt[1 - 2.` u])^2 x^2 -
     22.179627971677437` (-0.09449549842208152` + 1.` Sqrt[1 - 2.` u]) x^4 -
     1.366875` x^6 + 215.9902647341699` (-0.09449549842208152` + 1.` Sqrt[1 - 2.` u])
      (0.09449549842208152` - 1.` Sqrt[1 - 2.` u] - 0.2834864952662446` x^2)^2 -
     0.04265420378546604`
      (((-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3) u
           (1.3499999999999999` - 14.286394828777734` Sqrt[1 - 2.` u] - 2.25` x^2))/
         (0.45` - 4.762131609592578` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^2.`
      (-0.09449549842208152` + 1.` Sqrt[1 - 2.` u] + 0.09449549842208152` x^2)^3) +
  0.5` x^2 (0.45` - 4.762131609592578` Sqrt[1 - 2.` u] - 1.35` x^2)^2
   (3.6` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3) u x^2 - 1.8` (0.45` -
        4.762131609592578` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3) - 0.000023588043686631503`
      (((-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3) u
```

$$\left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` u} - 2.25` x^2\right)\Big) \Big/ \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`} \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.09449549842208152` x^2\right) - 0.8958298388468625` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.47247749211040757` x^2\right)\Big)^2 - 4.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right) \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 0.45` x^2\right)^2 \left(0.000023588043686631503` \left(\left(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.09449549842208152` x^2\right) + 0.8958298388468625` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.47247749211040757` x^2\right)\right) - 1.` \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^2 \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 0.45` x^2\right) \left(-2.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 + \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right) \left(0.000023588043686631503` \left(\left(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.09449549842208152` x^2\right) + 0.8958298388468625` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.47247749211040757` x^2\right)\right) + 2.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u x^2$$

$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)$$

$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 0.45` x^2\right)^2$$

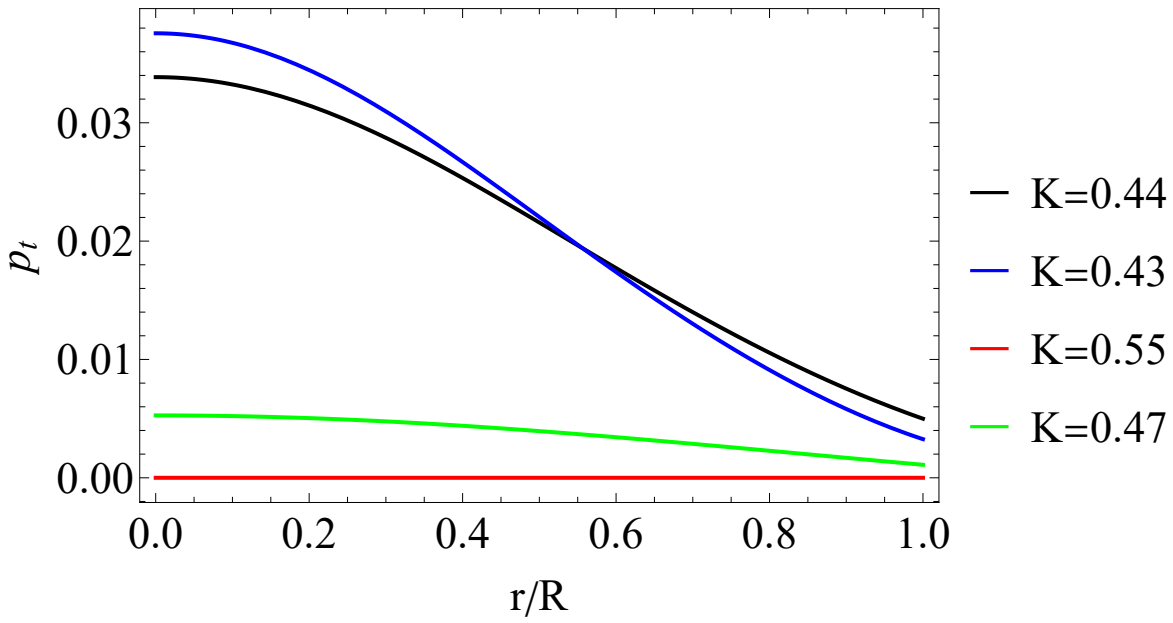
$$\left(-3.6` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 + 1.8` \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} + 0.000023588043686631503` \left(\left(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.09449549842208152` x^2\right) + 0.8958298388468625` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.47247749211040757` x^2\right)\right) - 1.` \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right) \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 0.45` x^2\right) \left(-2.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 + \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right) \left(90.7115898683232` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(0.09449549842208152` - 1.` \sqrt{1 - 2.` u} - 0.09449549842208152` x^2\right)^2 + 17.14367379453328` \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.2834864952662446` x^2\right) \left(1.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 - 0.5` \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\right) + \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right) \left(0.000023588043686631503` \left(\left(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3} \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.09449549842208152` x^2\right) + 0.8958298388468625` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u$$

$$\left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.47247749211040757` x^2\right)\Big)\Big)\Big)\Big/$$

$$\Big(\left(0.09449549842208152` - 1.` \sqrt{1 - 2.` u} - 0.2834864952662446` x^2\right)^2$$
$$\left(0.09449549842208152` - 1.` \sqrt{1 - 2.` u} - 0.09449549842208152` x^2\right)^2$$
$$\Big(1.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u x^2 -$$
$$0.5` \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}\Big)^2\Big)$$

In[ ]:=
```
solu1 := Re[Ptg1[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[Ptg2[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[Ptg3[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[Ptg4[x]] /. {u → 0.17642618727114115}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                        evaluado     verdadero
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
 estilo de represe··  negro  grosor          azul  grosor
    }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
       rojo  grosor          verde  grosor          rosa  grosor
 Frame → True, FrameLabel → {"r/R", "pt"}, ImageSize → 500,
 marco  verd···  etiqueta de marco          tamaño de imagen
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
 estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
 rango de rep···  comp···  leyendas de representación
```

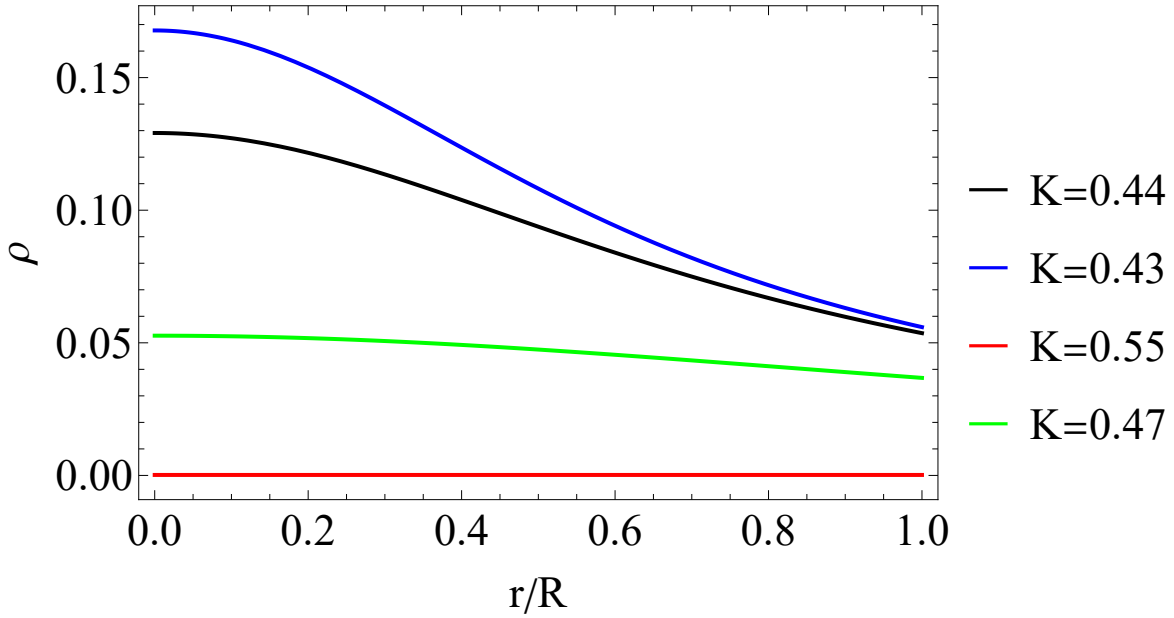
Out[ ]=



Densidad

In[ ]:=
```
ρg1[x_] :=
 (0.07957747154594767` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
    u (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25` x^2)) /
  (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3)
ρg2[x_] :=
 (0.07957747154594767` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3)
    u (1.35` - 5.771117804274949` Sqrt[1 - 2.` u] - 2.25` x^2)) /
  (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3)
ρg3[x_] :=
 (0.07957747154594767` (-0.9000000000000002` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3)
    u (1.35` - 4081.1414344674386` Sqrt[1 - 2.` u] - 2.25` x^2)) /
  (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3)
ρg4[x_] :=
 (0.07957747154594767` (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3)
    u (1.3499999999999999` - 14.286394828777734` Sqrt[1 - 2.` u] - 2.25` x^2)) /
  (0.45` - 4.762131609592578` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3)
solu1 := Re[ρg1[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[ρg2[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[ρg3[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[ρg4[x]] /. {u → 0.17642618727114115`}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                                evaluado  verdadero
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
 estilo de represe··  negro  grosor                    azul  grosor
    }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
       rojo  grosor                 verde  grosor                 rosa  grosor
 Frame → True, FrameLabel → {"r/R", "ρ"}, ImageSize → 500,
 marco  verd···  etiqueta de marco                  tamaño de imagen
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
 estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
 rango de rep···  comp···  leyendas de representación
```

Out[ ]=

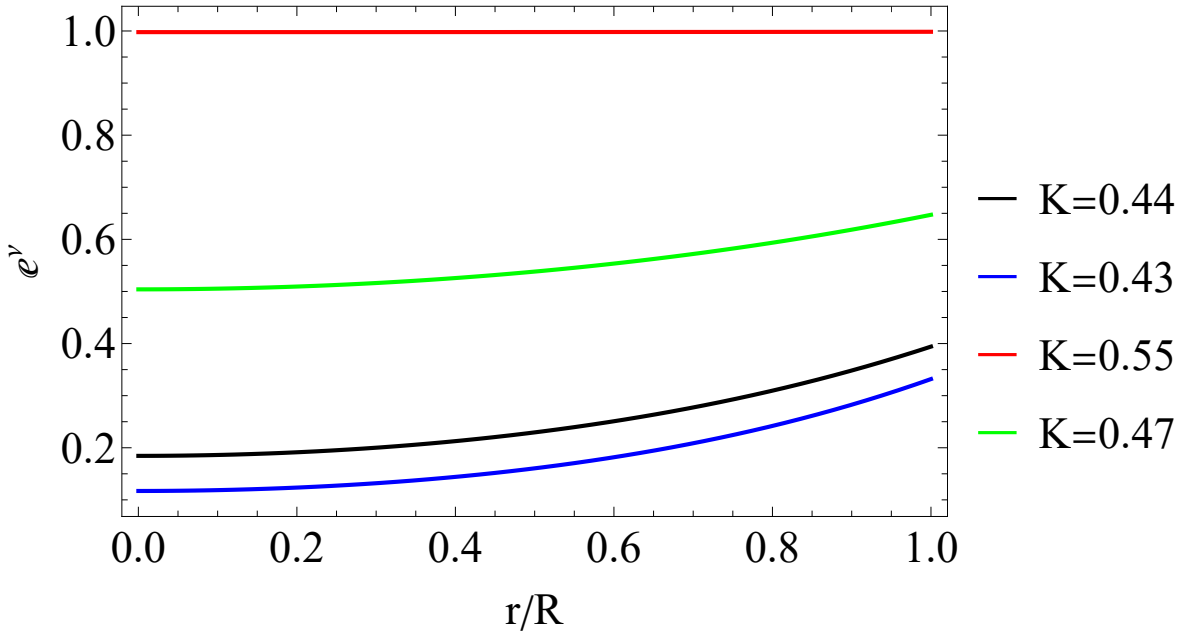


Gráficas de componentes metricas del espacio-tiempo

In[ ]:=
```
metric11[x_] := 1.` (0.1983721138549182` - 1.` Sqrt[1 - 2.` u] - 0.1983721138549182` x^2)^2
metric12[x_] := 1.` (0.2339234868849825` - 1.` Sqrt[1 - 2.` u] - 0.2339234868849825` x^2)^2
metric13[x_] := 0.9999999999999998`
  (0.00033078981007580934` - 1.` Sqrt[1 - 2.` u] - 0.00033078981007580934` x^2)^2
metric14[x_] := 1.` (0.09449549842208152` - 1.` Sqrt[1 - 2.` u] - 0.09449549842208152` x^2)^2
```

In[ ]:=
```
solu1 := Re[metric11[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[metric12[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[metric13[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[metric14[x]] /. {u → 0.17642618727114115`}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                                evaluado   verdadero
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
 estilo de represe··  negro   grosor                  azul   grosor
    }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
       rojo   grosor                verde   grosor                rosa   grosor
 Frame → True, FrameLabel → {"r/R", "e^ν"}, ImageSize → 500,
 marco   verd···   etiqueta de marco                tamaño de imagen
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
 estilo de etiqueta   tamaño de tipo de·   familia de tipo de··   multipli···   negro
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
 rango de rep···   comp···   leyendas de representación
```

Out[ ]=



In[ ]:=
$$\text{metric21}[x\_] := 1 - \left(2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u x^2\right) \Big/ \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}$$

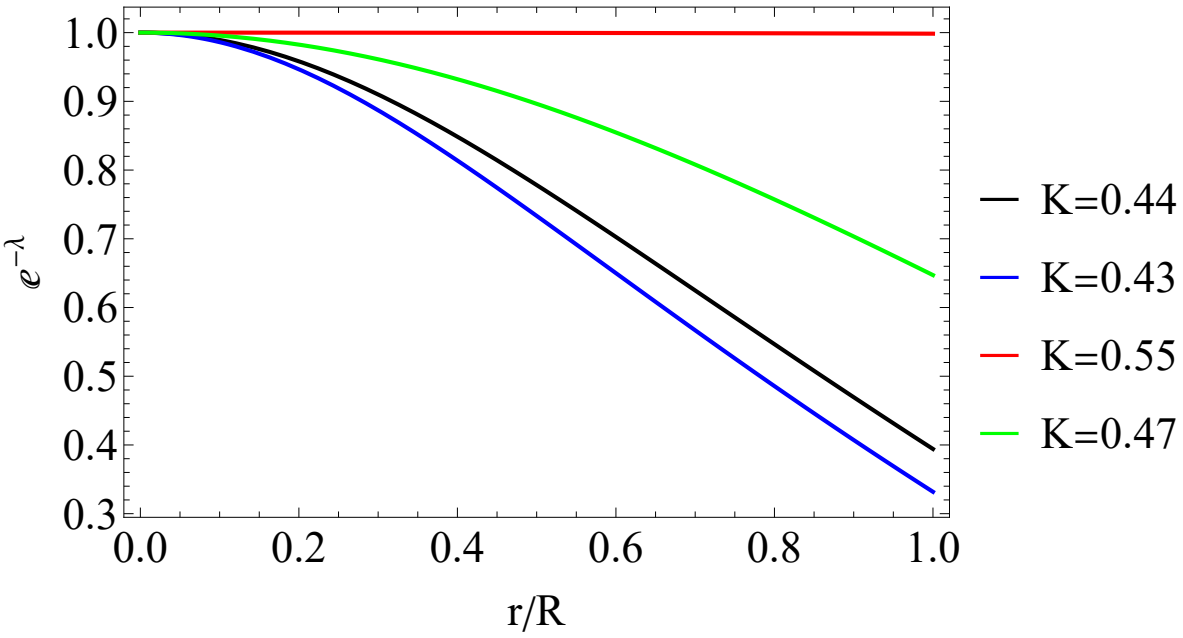
$$\text{metric22}[x\_] := 1 - \frac{2.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u x^2}{\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}}$$

$$\text{metric23}[x\_] := 1 - \frac{2.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u x^2}{\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}}$$

$$\text{metric24}[x\_] := 1 - \frac{2.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u x^2}{\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{2/3}}$$

In[ ]:=
```
solu1 := Re[metric21[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[metric22[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[metric23[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[metric24[x]] /. {u → 0.17642618727114115`}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                        evaluado      verdadero
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
 estilo de represe··  negro   grosor              azul    grosor
    }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
       rojo  grosor              verde  grosor              rosa  grosor
 Frame → True, FrameLabel → {"r/R", "e^-λ"}, ImageSize → 500,
 marco   verd···  etiqueta de marco              tamaño de imagen
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
 estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
 rango de rep···  comp···  leyendas de representación
```

Out[ ]=



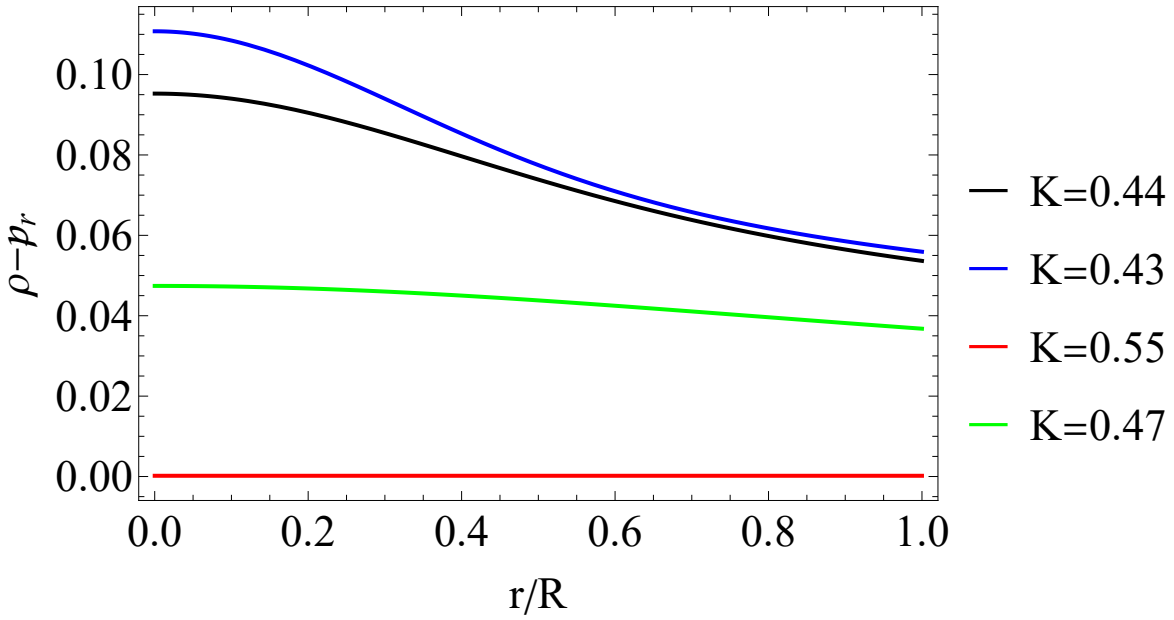
Condiciones de energía

Condición de energía dominante

In[ ]:=
```
dec11[x_] := ρg1[x] - Prg1[x];
dec12[x_] := ρg2[x] - Prg2[x];
dec13[x_] := ρg3[x] - Prg3[x];
dec14[x_] := ρg4[x] - Prg4[x];
```

In[ ]:=
```
solu1 := Re[dec11[x]] /. {u → 0.302917356305}
solu2 := Re[dec12[x]] /. {u → 0.3340789749418907}
solu3 := Re[dec13[x]] /. {u → 0.0007712244935388194`}
solu4 := Re[dec14[x]] /. {u → 0.17642618727114115`}
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
   }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
 Frame → True, FrameLabel → {"r/R", "ρ-pr"}, ImageSize → 500,
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
```

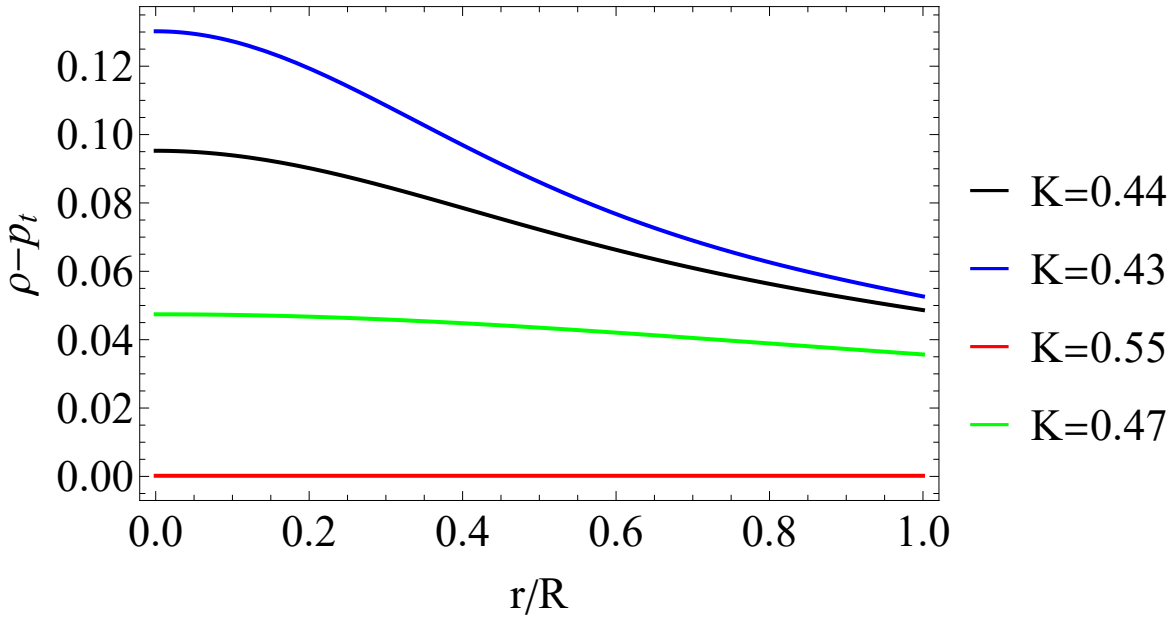
Out[ ]=



In[ ]:=
```
dec21[x_] := ρg1[x] - Ptg1[x];
dec22[x_] := ρg2[x] - Ptg2[x];
dec23[x_] := ρg3[x] - Ptg3[x];
dec24[x_] := ρg4[x] - Ptg4[x];
```

In[ ]:=
```
solu1 := Re[dec21[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[dec22[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[dec23[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[dec24[x]] /. {u → 0.17642618727114115`}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                                evaluado  verdadero
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
 estilo de represe··  negro  grosor                   azul  grosor
    }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
       rojo  grosor                verde  grosor                rosa  grosor
 Frame → True, FrameLabel → {"r/R", "ρ-p_t"}, ImageSize → 500,
 marco  verd···  etiqueta de marco                tamaño de imagen
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
 estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
 rango de rep···  comp···  leyendas de representación
```

Out[ ]=

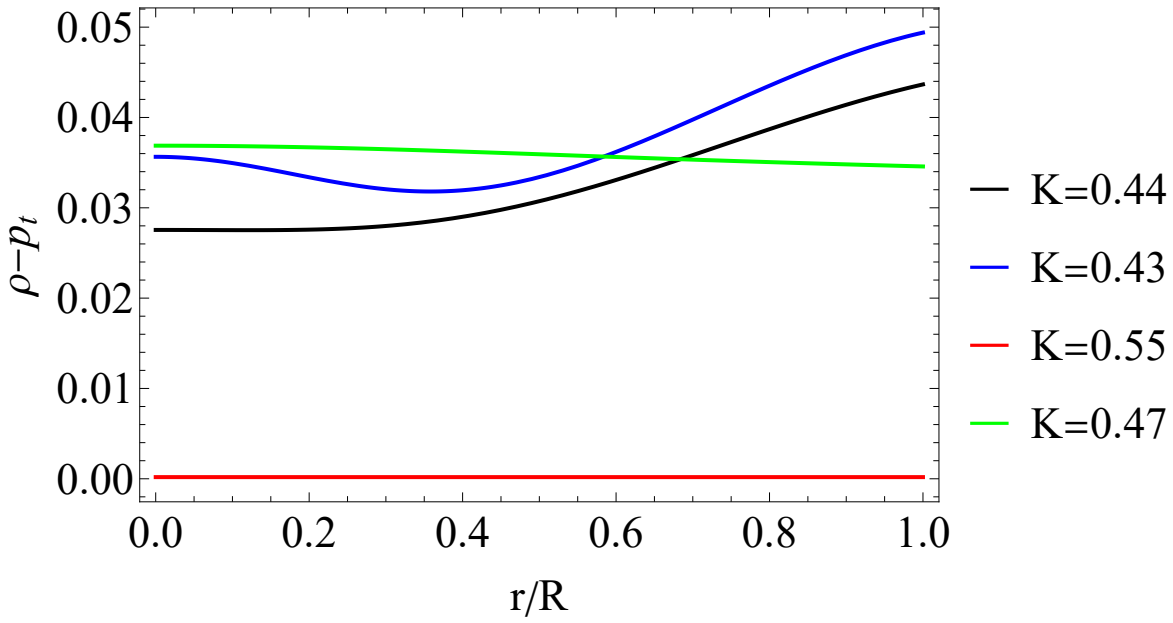


Condición de energía fuerte

In[ ]:=
```
sec1[x_] := ρg1[x] - Prg1[x] - 2 * Ptg1[x];
sec2[x_] := ρg2[x] - Prg2[x] - 2 * Ptg2[x];
sec3[x_] := ρg3[x] - Prg3[x] - 2 * Ptg3[x];
sec4[x_] := ρg4[x] - Prg4[x] - 2 * Ptg4[x];
```

In[ ]:=
```
solu1 := Re[sec1[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[sec2[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[sec3[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[sec4[x]] /. {u → 0.17642618727114115`}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                                evaluado  verdadero
  PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
  estilo de represe··  negro  grosor                  azul  grosor
     }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
          rojo  grosor                verde  grosor                rosa  grosor
  Frame → True, FrameLabel → {"r/R", "ρ-p_t"}, ImageSize → 500,
  marco  verd···  etiqueta de marco                tamaño de imagen
  LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
  estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
  PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
  rango de rep···  comp···  leyendas de representación
```

Out[ ]=

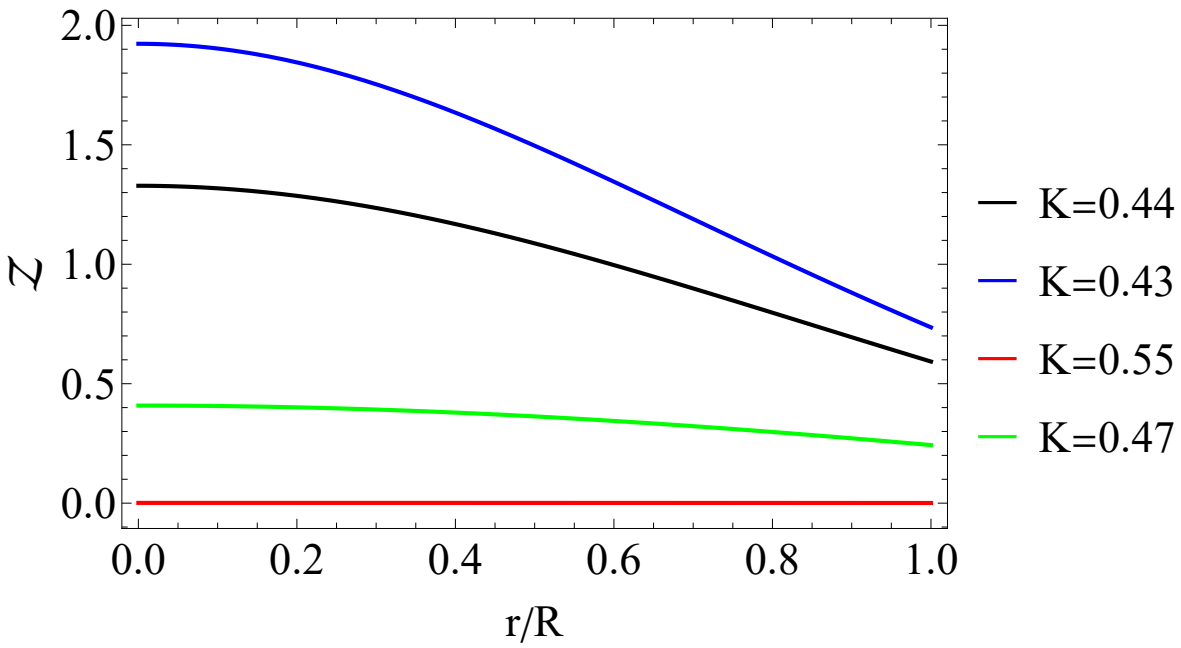


Corrimiento al rojo

In[ ]:=
```
Z1[x_] := -1 + 1.` / (√(0.1983721138549182` - 1.` √(1 - 2.` u) - 0.1983721138549182` x^2))^2

Z2[x_] := -1 + 0.9999999999999998` / √(0.2339234868849825` - 1.` √(1 - 2.` u) - 0.2339234868849825` x^2)^2

Z3[x_] := -1 + 1.0000000000000002` / (√(0.00033078981007580934` - 1.` √(1 - 2.` u) - 0.00033078981007580934` x^2))^2

Z4[x_] := -1 + 1.` / √(0.09449549842208152` - 1.` √(1 - 2.` u) - 0.09449549842208152` x^2)^2
```

In[ ]:=
```
solu1 := Re[Z1[x]] /. {u → 0.302917356305}
solu2 := Re[Z2[x]] /. {u → 0.3340789749418907}
solu3 := Re[Z3[x]] /. {u → 0.0007712244935388194`}
solu4 := Re[Z4[x]] /. {u → 0.17642618727114115`}
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
   }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
 Frame → True, FrameLabel → {"r/R", "Z"}, ImageSize → 500,
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
```

Out[ ]=



In[ ]:=
```
Z1[1] /. {u → 0.302917356305}
Z2[1] /. {u → 0.3340789749418907}
Z3[1] /. {u → 0.0007712244935388194}
Z4[1] /. {u → 0.17642618727114115`}
```

Out[ ]= 0.592798

Out[ ]= 0.735938

Out[ ]= 0.000772118

Out[ ]= 0.243078

Condición de causalidad:

Velocidad Radial

```
In[ ]:= vr1[x_] := (0.004720439574565849` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
    ((1/π) (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)
      (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 0.45` x^2)
      (4.86` + ((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
          (0.7464171974522293` - 3.762712323558393` Sqrt[1 - 2.` u] - 3.732085987261147`
            x^2)) / (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3) +
        8.293524416135883` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
        (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(1/3) + 0.00001650906751381325`
        (((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
            u (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25` x^2)) /
          (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
        (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.1983721138549182` x^2) -
       (0.000055030225046044185` (((-0.9000000000000001` - 2.2684640056268837`
                Sqrt[1 - 2.` u])^(2/3) u (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25`
              x^2)) / (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
          (0.19837211385491824` - 1.` Sqrt[1 - 2.` u] - 0.19837211385491818` x^2)^2) /
        (-0.19837211385491824` + 1.` Sqrt[1 - 2.` u] + 0.330620189758197` x^2) +
       5.503022504604416`*^-6
        (((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
            u (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25` x^2)) /
          (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
        (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.5951163415647547` x^2)) +
      0.2864788975654116` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)
      (-0.81` + 4.083235210128391` Sqrt[1 - 2.` u] + 2.43` x^2 + 0.000013870453859833131`
        (((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
            u (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25` x^2)) /
```

```
                (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
            (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.1983721138549182` x^2)
            (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.5951163415647547` x^2) +
          (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
           (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(1/3) (-0.8293524416135881` +
             4.180791470620436` Sqrt[1 - 2.` u] + 4.1467622080679405` x^2)) +
       0.8594366926962349` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 0.45` x^2)
        (-0.81` + 4.083235210128391` Sqrt[1 - 2.` u] + 2.43` x^2 + 0.000013870453859833131`
           (((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
               u (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25` x^2))/
              (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
            (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.1983721138549182` x^2)
            (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.5951163415647547` x^2) +
          (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
           (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(1/3) (-0.8293524416135881` +
             4.180791470620436` Sqrt[1 - 2.` u] + 4.1467622080679405` x^2))))/
     ((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
       u
       (0.1983721138549182` - 1.` Sqrt[1 - 2.` u] - 0.1983721138549182` x^2)^2
       (0.06262985035679756` -
         0.3157190249159851` Sqrt[1 - 2.` u] -
         0.06262985035679754` x^2))

vr2[x_] := (0.009127572132678053` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
     (1/π (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)
        (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 0.45` x^2)
        (4.86` + ((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
             (0.7503425174639905` - 3.2076407865488314` Sqrt[1 - 2.` u] - 3.751712587319952`
                x^2))/ (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3) +
          8.337139082933227` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3)
           u (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(1/3) +
          0.000011301104319637788`
```

$$\left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(-0.23392348688498252` + 1.` \sqrt{1 - 2.` u} + 0.23392348688498252` x^2\right) - \left(0.000037670347732125975` \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(0.23392348688498252` - 1.` \sqrt{1 - 2.` u} - 0.23392348688498252` x^2\right)^2\right) \Big/ \left(-0.23392348688498252` + 1.` \sqrt{1 - 2.` u} + 0.38987247814163745` x^2\right) + 3.7670347732125963`*^-6 \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.7017704606549475` x^2\right)\right) + 0.2864788975654116` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\right) \left(-0.81` + 3.4626706825649696` \sqrt{1 - 2.` u} + 2.43` x^2 + 8.051852388522243`*^-6 \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`} \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.2339234868849825` x^2\right) \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.7017704606549475` x^2\right) + \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{1/3} \left(-0.8337139082933227` + 3.56404531838759` \sqrt{1 - 2.` u} + 4.1685695414666135` x^2\right)\right) + 0.8594366926962349` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 0.45` x^2\right) \left(-0.81` + 3.4626706825649696` \sqrt{1 - 2.` u} + 2.43` x^2 + 8.051852388522243`*^-6 \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` x^2\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\right)^{3.`}$$

```
(-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.2339234868849825` x^2)
(-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.7017704606549475` x^2) +
(-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
(0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(1/3) (-0.8337139082933227` +
3.56404531838759` Sqrt[1 - 2.` u] + 4.1685695414666135` x^2))))) /
((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3)
u
(0.2339234868849825` - 1.` Sqrt[1 - 2.` u] - 0.2339234868849825` x^2)^2
(0.08708989953535455` -
0.37230079243037134` Sqrt[1 - 2.` u] -
0.0870898995353546` x^2))

vr3[x_] := (3.649794805791777`*^-14 (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
((1/π) (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)
(0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 0.45` x^2)
(4.86` + ((-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u
(0.6944593291179939` - 2099.397587122892` Sqrt[1 - 2.` u] - 3.4722966455899695`
x^2)) / (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3) +
7.71621476797771` (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3)
u (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(1/3) + 0.07425859201003344`
(((-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3)
u (1.35` - 4081.1414344674386` Sqrt[1 - 2.` u] - 2.25` x^2)) /
(0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
(-0.00033078981007580934` + 1.` Sqrt[1 - 2.` u] + 0.00033078981007580934` x^2) -
(0.24752864003344488` (((-0.9000000000000001` - 1360.3804781558129`
Sqrt[1 - 2.` u])^(2/3) u (1.35` - 4081.1414344674386` Sqrt[1 - 2.` u] - 2.25`
x^2)) / (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(5/3))^3.`
(0.00033078981007580934` - 1.` Sqrt[1 - 2.` u] - 0.00033078981007580934` x^2)^2) /
(-0.00033078981007580934` + 1.` Sqrt[1 - 2.` u] + 0.0005513163501263489` x^2) +
0.02475286400334448`
(((-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3)
```

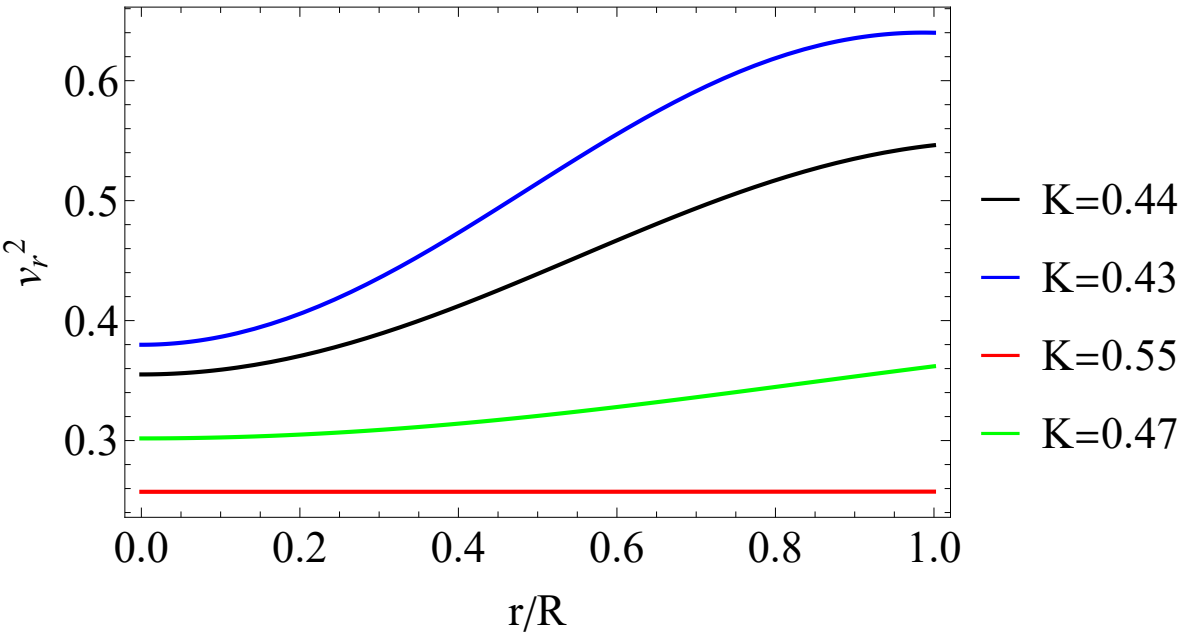
```
                u (1.35` - 4081.1414344674386` √(1 - 2.` u) - 2.25` x^2))) /
              (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` x^2)^(5/3))^3.`
          (-0.00033078981007580934` + 1.` √(1 - 2.` u) + 0.000992369430227428` x^2)) +
      0.2864788975654116` (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` x^2)
       (-0.81` + 2448.6848606804633` √(1 - 2.` u) + 2.43` x^2 + 37.41479218732841`
          (((-0.9000000000000001` - 1360.3804781558129` √(1 - 2.` u))^(2/3)
                u (1.35` - 4081.1414344674386` √(1 - 2.` u) - 2.25` x^2))) /
              (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` x^2)^(5/3))^3.`
          (-0.00033078981007580934` + 1.` √(1 - 2.` u) + 0.00033078981007580934` x^2)
          (-0.00033078981007580934` + 1.` √(1 - 2.` u) + 0.000992369430227428` x^2) +
        (-0.9000000000000001` - 1360.3804781558129` √(1 - 2.` u))^(2/3) u
         (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` x^2)^(1/3) (-0.7716214767977709` +
           2332.6639856921024` √(1 - 2.` u) + 3.858107383988855` x^2)) +
      0.8594366926962349` (0.45` - 1360.3804781558129` √(1 - 2.` u) - 0.45` x^2)
       (-0.81` + 2448.6848606804633` √(1 - 2.` u) + 2.43` x^2 + 37.41479218732841`
          (((-0.9000000000000001` - 1360.3804781558129` √(1 - 2.` u))^(2/3)
                u (1.35` - 4081.1414344674386` √(1 - 2.` u) - 2.25` x^2))) /
              (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` x^2)^(5/3))^3.`
          (-0.00033078981007580934` + 1.` √(1 - 2.` u) + 0.00033078981007580934` x^2)
          (-0.00033078981007580934` + 1.` √(1 - 2.` u) + 0.000992369430227428` x^2) +
        (-0.9000000000000001` - 1360.3804781558129` √(1 - 2.` u))^(2/3) u
         (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` x^2)^(1/3) (-0.7716214767977709` +
           2332.6639856921024` √(1 - 2.` u) + 3.858107383988855` x^2)))))) /
   ((-0.9000000000000001` - 1360.3804781558129` √(1 - 2.` u))^(2/3)
    u
    (0.00033078981007580934` - 1.` √(1 - 2.` u) - 0.00033078981007580934` x^2)^2
    (1.7415036020815318`*^-7 -
      0.0005264683339799432` √(1 - 2.` u) -
      1.7415036020815318`*^-7 x^2))

vr4[x_] := (0.00024305493207293365` (0.45` - 4.762131609592578` √(1 - 2.` u) - 1.35` x^2)^(2/3)
```

$$\left(\frac{1}{\pi}\left(0.45` - 4.762131609592578`\sqrt{1-2.` u} - 1.35` x^2\right)\right.$$
$$\left(0.45` - 4.762131609592578`\sqrt{1-2.` u} - 0.45` x^2\right)$$
$$\left(4.86` + \left(\left(-0.9000000000000001` - 4.762131609592578`\sqrt{1-2.` u}\right)^{2/3} u\right.\right.$$
$$\left(0.7338133015891135` - 7.765590042304464`\sqrt{1-2.` u} - 3.6690665079455673` x^2\right)\Big)\Big/$$
$$\left(0.45` - 4.762131609592578`\sqrt{1-2.` u} - 1.35` x^2\right)^{2/3} +$$
$$8.153481128767927`\left(-0.9000000000000001` - 4.762131609592578`\sqrt{1-2.` u}\right)^{2/3}$$
$$u\left(0.45` - 4.762131609592578`\sqrt{1-2.` u} - 1.35` x^2\right)^{1/3} + 0.00006368771795390506`$$
$$\left(\left(\left(-0.9000000000000001` - 4.762131609592578`\sqrt{1-2.` u}\right)^{2/3} u\right.\right.$$
$$\left(1.3499999999999999` - 14.286394828777734`\sqrt{1-2.` u} - 2.25` x^2\right)\Big)\Big/$$
$$\left(0.45` - 4.762131609592578`\sqrt{1-2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`}$$
$$\left(-0.09449549842208152` + 1.`\sqrt{1-2.` u} + 0.09449549842208152` x^2\right) -$$
$$\left(0.00021229239317968 36`\right.$$
$$\left(\left(\left(-0.9000000000000001` - 4.762131609592578`\sqrt{1-2.` u}\right)^{2/3} u\right.\right.$$
$$\left(1.3499999999999999` - 14.286394828777734`\sqrt{1-2.` u} - 2.25` x^2\right)\Big)\Big/$$
$$\left(0.45` - 4.762131609592578`\sqrt{1-2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`}$$
$$\left(-0.09449549842208152` + 1.`\sqrt{1-2.` u} + 0.09449549842208152` x^2\right)$$
$$\left(-0.0944954984220815` + 1.`\sqrt{1-2.` u} + 0.09449549842208155` x^2\right)\Big)\Big/$$
$$\left(-0.09449549842208152` + 1.`\sqrt{1-2.` u} + 0.15749249737013588` x^2\right) +$$
$$0.000021229239317968355`$$
$$\left(\left(\left(-0.9000000000000001` - 4.762131609592578`\sqrt{1-2.` u}\right)^{2/3} u\right.\right.$$
$$\left(1.3499999999999999` - 14.286394828777734`\sqrt{1-2.` u} - 2.25` x^2\right)\Big)\Big/$$
$$\left(0.45` - 4.762131609592578`\sqrt{1-2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`}$$
$$\left(-0.09449549842208152` + 1.`\sqrt{1-2.` u} + 0.2834864952662446` x^2\right)\Big) +$$
$$0.2864788975654116`\left(0.45` - 4.762131609592578`\sqrt{1-2.` u} - 1.35` x^2\right)$$
$$\left(-0.81` + 8.571836897266643`\sqrt{1-2.` u} + 2.43` x^2 + 0.00011232936844855853`\right.$$
$$\left(\left(\left(-0.9000000000000001` - 4.762131609592578`\sqrt{1-2.` u}\right)^{2/3} u\right.\right.$$
$$\left(1.3499999999999999` - 14.286394828777734`\sqrt{1-2.` u} - 2.25` x^2\right)\Big)\Big/$$
$$\left(0.45` - 4.762131609592578`\sqrt{1-2.` u} - 1.35` x^2\right)^{5/3}\Big)^{3.`}$$
$$\left(-0.09449549842208152` + 1.`\sqrt{1-2.` u} + 0.09449549842208152` x^2\right)$$

$$\left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.2834864952662446` x^2\right) +$$
$$\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{1/3} \left(-0.8153481128767929` +$$
$$8.628433380338295` \sqrt{1 - 2.` u} + 4.0767405643839645` x^2\right)\Bigg) +$$
$$0.8594366926962349` \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 0.45` x^2\right)$$
$$\Bigg(-0.81` + 8.571836897266643` \sqrt{1 - 2.` u} + 2.43` x^2 + 0.00011232936844855853`$$
$$\Bigg(\Bigg(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(1.3499999999999999` - 14.286394828777734` \sqrt{1 - 2.` u} - 2.25` x^2\right)\Bigg) \Big/$$
$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{5/3}\Bigg)^{3.`}$$
$$\left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.09449549842208152` x^2\right)$$
$$\left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.2834864952662446` x^2\right) +$$
$$\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` x^2\right)^{1/3} \left(-0.8153481128767929` +$$
$$8.628433380338295` \sqrt{1 - 2.` u} + 4.0767405643839645` x^2\right)\Bigg)\Bigg)\Bigg) \Big/$$
$$\Bigg(\left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u$$
$$\left(0.09449549842208152` - 1.` \sqrt{1 - 2.` u} - 0.09449549842208152` x^2\right)^2$$
$$\Big(0.014211580250282107` -$$
$$0.15039425673806672` \sqrt{1 - 2.` u} -$$
$$0.01421158025028211` x^2\Big)\Bigg)$$

In[ ]:=
```
solu1 := Re[vr1[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[vr2[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[vr3[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[vr4[x]] /. {u → 0.17642618727114115`}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                                evaluado  verdadero
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
  estilo de represe··  negro  grosor                  azul  grosor
    }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
       rojo  grosor                verde  grosor                rosa  grosor
 Frame → True, FrameLabel → {"r/R", "v_r^2"}, ImageSize → 500,
  marco  verd···  etiqueta de marco                tamaño de imagen
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
  estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
  rango de rep···  comp···  leyendas de representación
```

Out[ ]=

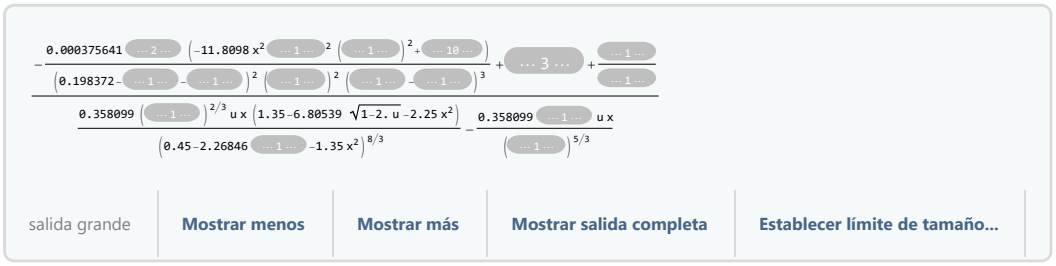


Velocidad Tangencial

In[ ]:=
```
vt1[r_] := D[Pt1[r], r] / D[ρ1[r], r]
vt2[r_] := D[Pt2[r], r] / D[ρ2[r], r]
vt3[r_] := D[Pt3[r], r] / D[ρ3[r], r]
vt4[r_] := D[Pt4[r], r] / D[ρ4[r], r]
```

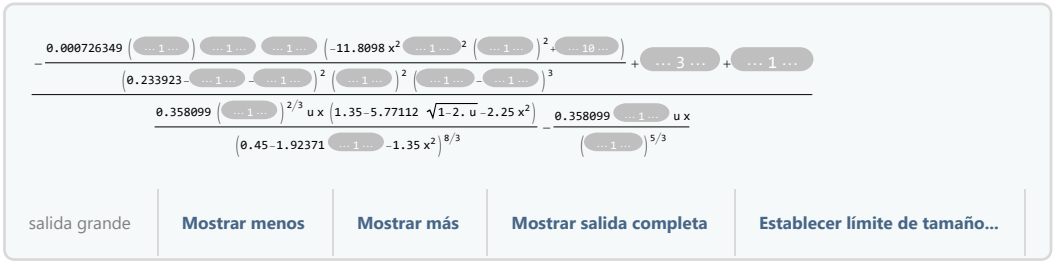
In[ ]:=
```
vt1[r] /. {M → u R, r → x R, R → 1}
vt2[r] /. {M → u R, r → x R, R → 1}
vt3[r] /. {M → u R, r → x R , R → 1}
vt4[r] /. {M → u R, r → x R , R → 1}
```

Out[ ]=



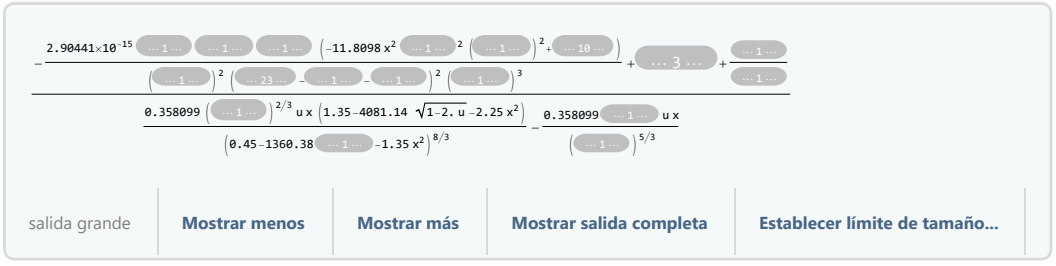
salida grande | Mostrar menos | Mostrar más | Mostrar salida completa | Establecer límite de tamaño...

Out[ ]=



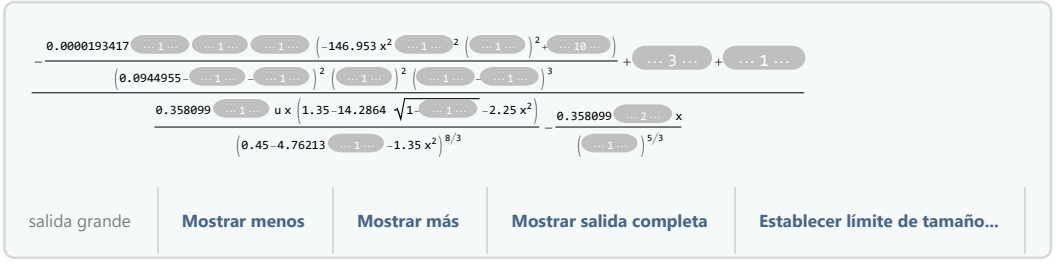
salida grande | Mostrar menos | Mostrar más | Mostrar salida completa | Establecer límite de tamaño...

Out[ ]=



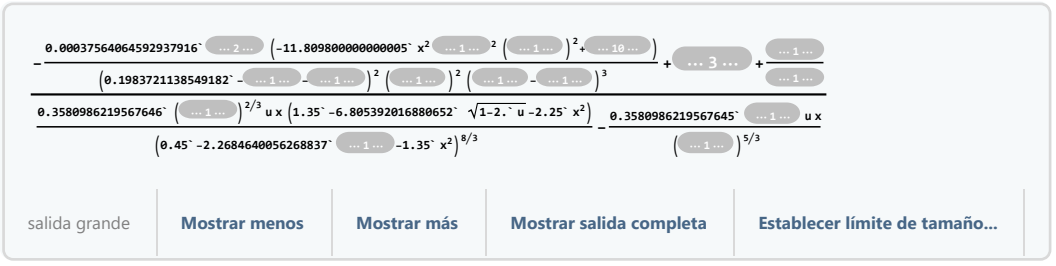
salida grande | Mostrar menos | Mostrar más | Mostrar salida completa | Establecer límite de tamaño...

Out[ ]=



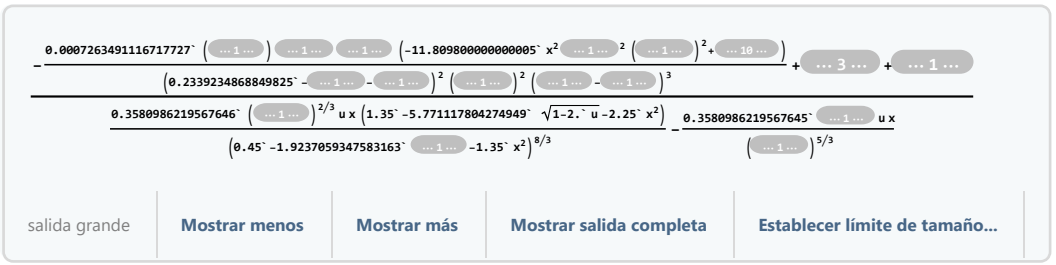
salida grande | Mostrar menos | Mostrar más | Mostrar salida completa | Establecer límite de tamaño...

In[ ]:=
```
vt1[x_] :=
```

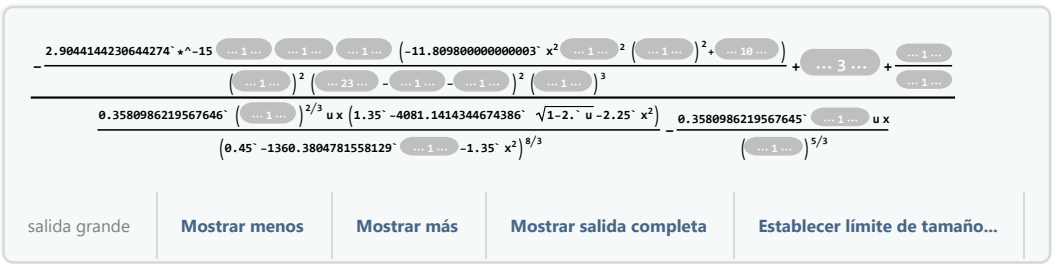


salida grande | Mostrar menos | Mostrar más | Mostrar salida completa | Establecer límite de tamaño...

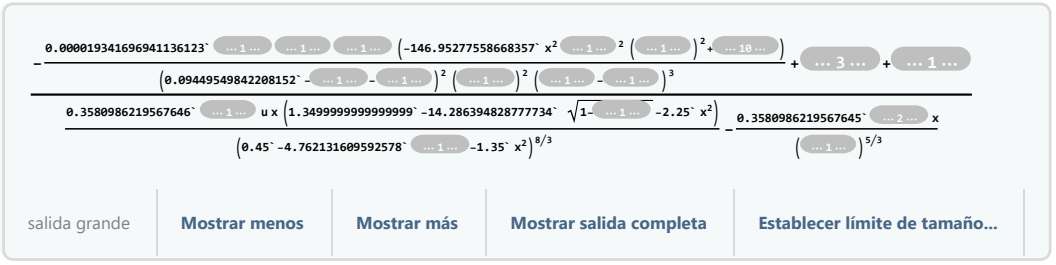
In[ ]:= **vt2[x_] :=**



In[ ]:= **vt3[x_] :=**

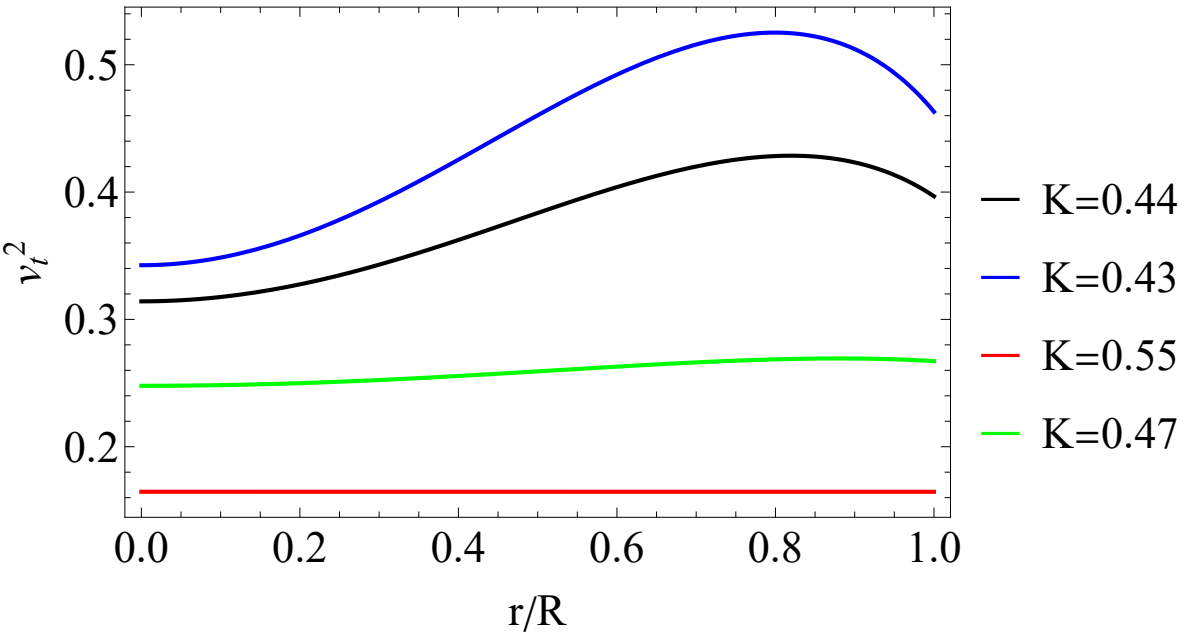


In[ ]:= **vt4[x_] :=**



In[ ]:=
```
solu1 := Re[vt1[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[vt2[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[vt3[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[vt4[x]] /. {u → 0.17642618727114115`}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                                evaluado  verdadero
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
  estilo de represe··  negro  grosor                  azul  grosor
    }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
       rojo  grosor                verde  grosor                rosa  grosor
 Frame → True, FrameLabel → {"r/R", "v_t^2"}, ImageSize → 500,
  marco  verd···  etiqueta de marco                tamaño de imagen
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
  estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
  rango de rep···  comp···  leyendas de representación
```

Out[ ]=

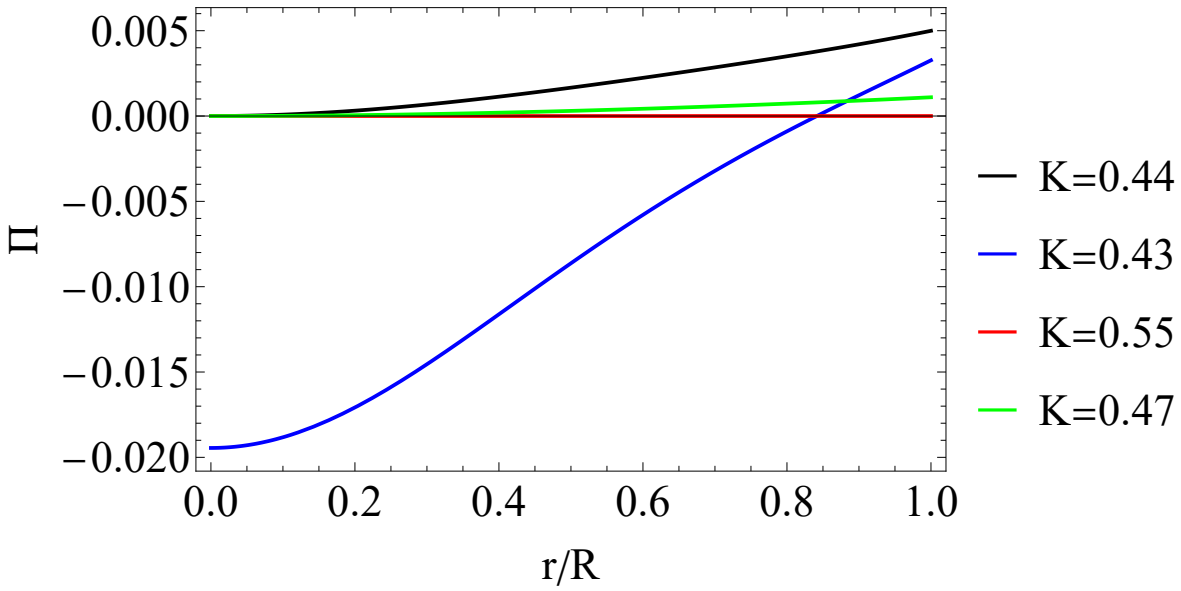


Anisotropía

In[ ]:=
```
Π1[x_] := Ptg1[x] - Prg1[x]
Π2[x_] := Ptg2[x] - Prg2[x]
Π3[x_] := Ptg3[x] - Prg3[x]
Π4[x_] := Ptg4[x] - Prg4[x]
```

In[•]:=
```
solu1 := Re[Π1[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[Π2[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[Π3[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[Π4[x]] /. {u → 0.17642618727114115`}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                        evaluado    verdadero
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
  estilo de represe··  negro  grosor          azul  grosor
    }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
       rojo  grosor              verde  grosor              rosa  grosor
 Frame → True, FrameLabel → {"r/R", "Π"}, ImageSize → 500,
  marco  verd···  etiqueta de marco          tamaño de imagen
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
  estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
  rango de rep···  comp···  leyendas de representación
```

Out[•]=



In[•]:=
```
Π1c[x_, y_] := -((0.0077320802909626556`
  (-0.81` + 4.083235210128391` √(1 - 2.` u) + 2.43` (x^2 + y^2)) + 0.0000138704538598331316`
   (((-0.9000000000000001` - 2.2684640056268837` √(1 - 2.` u))^(2/3) u
      (1.35` - 6.805392016880652` √(1 - 2.` u) - 2.25` (x^2 + y^2)))/
     (0.45` - 2.2684640056268837` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(5/3))^3.`
   (-0.1983721138549182` + 1.` √(1 - 2.` u) + 0.1983721138549182` (x^2 + y^2))
   (-0.1983721138549182` + 1.` √(1 - 2.` u) + 0.5951163415647547` (x^2 + y^2)) +
  (-0.9000000000000001` - 2.2684640056268837` √(1 - 2.` u))^(2/3) u
```

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{1/3}$$
$$\left(-0.8293524416135881` + 4.180791470620436` \sqrt{1 - 2.` u} + 4.1467622080679405` \left(x^2 + y^2\right)\right)\Big)\Big) \Big/$$
$$\left(\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` \left(x^2 + y^2\right)\right)\right.$$
$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.5951163415647547` \left(x^2 + y^2\right)\right)\Big)\Big) + \Bigg(0.00018782032296468958`$$
$$\left(1 - \frac{2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right)}{\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}}\right)$$
$$\left(-33.34561956246449` \left(x^2 + y^2\right)\right.$$
$$\left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.5951163415647547` \left(x^2 + y^2\right)\right)^2$$
$$\left(1.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) - 0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\right)^2 +$$
$$84.04815302530929` \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.5951163415647547` \left(x^2 + y^2\right)\right)^2$$
$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` \left(x^2 + y^2\right)\right)$$
$$\left(1.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) - 0.5` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\right)^2 +$$
$$0.2825902335456476` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(x^2 + y^2\right) \left(-2.` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) + \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\right)$$
$$\left(-11.673354586848513` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u}\right)^3 - 20.8410122265403` \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u}\right)^2 \left(x^2 + y^2\right) - 10.56537110620721` \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u}\right) \left(x^2 + y^2\right)^2 - 1.366875` \left(x^2 + y^2\right)^3 + 23.346709173697025`\right.$$
$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u}\right) \left(0.1983721138549182` - 1.` \sqrt{1 - 2.` u} - 0.5951163415647547` \left(x^2 + y^2\right)\right)^2 - 0.003006278288724897`$$
$$\left(\left(\left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\right) \Big/\right.$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Big)^{2.`}$$

$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` \left(x^2 + y^2\right)\right)^3\Big) +$$

$$0.5` \left(x^2 + y^2\right) \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^2$$

$$\Big(3.6` \left(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) -$$

$$1.8` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} -$$

$$6.1144694495604615`*^-6$$

$$\Big(\Big(\Big(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\Big)^{2/3} u$$

$$\left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\Big)\Big/$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Big)^{3.`}$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}$$

$$\Big(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} +$$

$$0.1983721138549182` \left(x^2 + y^2\right)\Big) - 0.3561365406333312`$$

$$\Big(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\Big)^{2/3} u$$

$$\left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` \left(x^2 + y^2\right)\right)\Big)^2 -$$

$$4.` \Big(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\Big)^{2/3} u$$

$$\left(x^2 + y^2\right) \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right)^2$$

$$\Big(6.1144694495604615`*^-6$$

$$\Big(\Big(\Big(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\Big)^{2/3} u$$

$$\left(1.35` - 6.805392016880652` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\Big)\Big/$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Big)^{3.`}$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}$$

$$\Big(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.1983721138549182` \left(x^2 + y^2\right)\Big) +$$

$$0.3561365406333312` \Big(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\Big)^{2/3}$$

$$u \left(-0.1983721138549182` + 1.` \sqrt{1 - 2.` u} + 0.9918605692745911` \left(x^2 + y^2\right)\right)\Big) -$$

$$1.` \left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^2$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right)$$

$$\Big(-2.` \Big(-0.9000000000000001` - 2.2684640056268837` \sqrt{1 - 2.` u}\Big)^{2/3} u \left(x^2 + y^2\right) +$$

$$\left(0.45` - 2.2684640056268837` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\Big)$$

```
(6.1144694495604615`*^-6
    ((((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
          (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25` (x^2 + y^2)))) /
       (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(5/3))^3.`
    (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
    (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.1983721138549182` (x^2 + y^2)) +
   0.3561365406333312` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
    u (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.9918605692745911` (x^2 + y^2))) +
 2.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
  (x^2 + y^2) (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))
  (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 0.45` (x^2 + y^2))^2
  (-3.6` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) +
    1.8` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3) +
    6.1144694495604615`*^-6
     ((((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
           (1.35` - 6.805392016880652` Sqrt[1 - 2.` u] - 2.25` (x^2 + y^2)))) /
        (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(5/3))^3.`
     (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
     (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.1983721138549182` (x^2 + y^2)) +
    0.3561365406333312` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
     u (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.9918605692745911` (x^2 + y^2))) -
 1.` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))
  (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 0.45` (x^2 + y^2))
  (-2.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) +
    (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))
  (20.583715779299066` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
     u (0.1983721138549182` - 1.` Sqrt[1 - 2.` u] - 0.1983721138549182` (x^2 + y^2))^2 +
    8.16647042025678` (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] +
       0.5951163415647547` (x^2 + y^2))
     (1.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) -
```

```
0.5` (0.45` - 2.2684640056268837` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(2/3)) +
 (0.45` - 2.2684640056268837` √(1 - 2.` u) - 1.35` (x^2 + y^2))
  (6.1144694495604615`*^-6
    (((-0.9000000000000001` - 2.2684640056268837` √(1 - 2.` u))^(2/3) u
        (1.35` - 6.805392016880652` √(1 - 2.` u) - 2.25` (x^2 + y^2)))/
      (0.45` - 2.2684640056268837` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(5/3))^3.`
    (0.45` - 2.2684640056268837` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(2/3)
    (-0.1983721138549182` + 1.` √(1 - 2.` u) + 0.1983721138549182` (x^2 + y^2)) +
   0.3561365406333312` (-0.9000000000000001` - 2.2684640056268837`
       √(1 - 2.` u))^(2/3) u (-0.1983721138549182` +
      1.` √(1 - 2.` u) + 0.9918605692745911` (x^2 + y^2))))/
 ((0.1983721138549182` - 1.` √(1 - 2.` u) - 0.5951163415647547` (x^2 + y^2))^2
   (0.1983721138549182` - 1.` √(1 - 2.` u) - 0.1983721138549182` (x^2 + y^2))^2
   (1.` (-0.9000000000000001` - 2.2684640056268837` √(1 - 2.` u))^(2/3) u (x^2 + y^2) -
     0.5` (0.45` - 2.2684640056268837` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(2/3))^2)

Π2c[x_, y_] := -((0.010751839448809199`
    (-0.81` + 3.4626706825649696` √(1 - 2.` u) + 2.43` (x^2 + y^2) + 8.051852388522243`*^-6
      (((-0.9000000000000001` - 1.9237059347583163` √(1 - 2.` u))^(2/3) u
          (1.35` - 5.771117804274949` √(1 - 2.` u) - 2.25` (x^2 + y^2)))/
        (0.45` - 1.9237059347583163` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(5/3))^3.`
      (-0.2339234868849825` + 1.` √(1 - 2.` u) + 0.2339234868849825` (x^2 + y^2))
      (-0.2339234868849825` + 1.` √(1 - 2.` u) + 0.7017704606549475` (x^2 + y^2)) +
     (-0.9000000000000001` - 1.9237059347583163` √(1 - 2.` u))^(2/3) u
      (0.45` - 1.9237059347583163` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(1/3)
      (-0.8337139082933227` + 3.56404531838759` √(1 - 2.` u) +
       4.1685695414666135` (x^2 + y^2))))/
 ((-0.2339234868849825` + 1.` √(1 - 2.` u) + 0.2339234868849825` (x^2 + y^2))
   (-0.2339234868849825` + 1.` √(1 - 2.` u) +
```

```
    0.7017704606549475` (x^2 + y^2)))) + (0.00036317455583588634`
(1 - (2.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2))/
    (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))
(-23.980176511789907` (x^2 + y^2)
    (0.2339234868849825` - 1.` Sqrt[1 - 2.` u] - 0.7017704606549475` (x^2 + y^2))^2
    (1.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) -
        0.5` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))^2 +
  51.25645319142468` (0.2339234868849825` - 1.` Sqrt[1 - 2.` u] -
        0.7017704606549475` (x^2 + y^2))^2
    (-0.23392348688498252` + 1.` Sqrt[1 - 2.` u] + 0.23392348688498252` (x^2 + y^2))
    (1.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) -
        0.5` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))^2 +
  0.26514436682670883` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3)
   u (x^2 + y^2) (-2.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3)
        u (x^2 + y^2) + (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))
    (-7.118951832142317` (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u])^3 -
      14.987610319868688` (0.2339234868849825` - 1.` Sqrt[1 - 2.` u])^2 (x^2 + y^2) -
      8.95966039113686` (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u]) (x^2 + y^2)^2 - 1.366875`
       (x^2 + y^2)^3 + 14.237903664284634` (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u])
       (0.2339234868849825` - 1.` Sqrt[1 - 2.` u] - 0.7017704606549475` (x^2 + y^2))^2 -
      0.0015773056131510555`
       (((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
            (1.35` - 5.771117804274949` Sqrt[1 - 2.` u] - 2.25` (x^2 + y^2)))/
          (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(5/3))^2.`
       (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.2339234868849825` (x^2 + y^2))^3) +
  0.5` (x^2 + y^2) (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^2
    (3.6` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) -
        1.8` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3) -
        4.18559419245844`*^-6
```

$$\left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\right)^{3.`} \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.2339234868849825` \left(x^2 + y^2\right)\right) - 0.2833665511290421` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 1.1696174344249124` \left(x^2 + y^2\right)\right)\right)^2 - 4.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right) \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right)^2 \left(4.18559419245844` *^-6 \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\right)^{3.`} \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.2339234868849825` \left(x^2 + y^2\right)\right) + 0.2833665511290421` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 1.1696174344249124` \left(x^2 + y^2\right)\right)\right) - 1.` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^2 \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right) \left(-2.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) + \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\right) \left(4.18559419245844` *^-6 \left(\left(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\right) \Big/ \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\right)^{3.`} \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.2339234868849825` \left(x^2 + y^2\right)\right) + 0.2833665511290421` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3}$$

```
      u (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 1.1696174344249124` (x^2 + y^2))) +
  2.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
   (x^2 + y^2) (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))
   (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 0.45` (x^2 + y^2))^2
   (-3.6` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) +
     1.8` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3) +
     4.18559419245844`*^-6
      (((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
           (1.35` - 5.771117804274949` Sqrt[1 - 2.` u] - 2.25` (x^2 + y^2)))/
         (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(5/3))^3.`
      (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
      (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.2339234868849825` (x^2 + y^2)) +
     0.2833665511290421` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3)
      u (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 1.1696174344249124` (x^2 + y^2))) -
  1.` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))
   (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 0.45` (x^2 + y^2))
   (-2.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) +
     (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))
   (14.80257809369747` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3)
      u (0.2339234868849825` - 1.` Sqrt[1 - 2.` u] - 0.2339234868849825` (x^2 + y^2))^2 +
     6.925341365129939` (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] +
        0.7017704606549475` (x^2 + y^2))
      (1.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) -
        0.5` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)) + (0.45` -
        1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2)) (4.18559419245844`*^-6
         (((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
              (1.35` - 5.771117804274949` Sqrt[1 - 2.` u] - 2.25` (x^2 + y^2)))/
            (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(5/3))^3.`
         (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
         (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.2339234868849825` (x^2 + y^2)) +
```

```
0.2833665511290421` (-0.9000000000000001` - 1.9237059347583163`
                √(1 - 2.` u))^(2/3) u (-0.2339234868849825` +
              1.` √(1 - 2.` u) + 1.1696174344249124` (x^2 + y^2)))))/
  ((0.2339234868849825` - 1.` √(1 - 2.` u) - 0.7017704606549475` (x^2 + y^2))^2
    (0.2339234868849825` - 1.` √(1 - 2.` u) - 0.2339234868849825` (x^2 + y^2))^2
    (1.` (-0.9000000000000001` - 1.9237059347583163` √(1 - 2.` u))^(2/3) u (x^2 + y^2) -
      0.5` (0.45` - 1.9237059347583163` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(2/3))^2)

Π3c[x_, y_] := -(((2.1500044470142357`*^-8
      (-0.81` + 2448.6848606804633` √(1 - 2.` u) + 2.43` (x^2 + y^2) + 37.41479218732841`
        (((-0.9000000000000002` - 1360.3804781558129` √(1 - 2.` u))^(2/3) u
            (1.35` - 4081.1414344674386` √(1 - 2.` u) - 2.25` (x^2 + y^2)))/
          (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(5/3))^3.`
        (-0.00033078981007580934` + 1.` √(1 - 2.` u) + 0.00033078981007580934` (x^2 + y^2))
        (-0.00033078981007580934` + 1.` √(1 - 2.` u) + 0.000992369430227428` (x^2 + y^2)) +
       (-0.9000000000000002` - 1360.3804781558129` √(1 - 2.` u))^(2/3) u
        (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(1/3)
        (-0.7716214767977709` + 2332.6639856921024` √(1 - 2.` u) +
          3.858107383988855` (x^2 + y^2)))))/
    ((-0.00033078981007580934` + 1.` √(1 - 2.` u) + 0.00033078981007580934` (x^2 + y^2))
      (-0.00033078981007580934` + 1.` √(1 - 2.` u) +
        0.000992369430227428` (x^2 + y^2)))) + (1.4522072115322137`*^-15
    (1 - (2.` (-0.9000000000000001` - 1360.3804781558129` √(1 - 2.` u))^(2/3) u (x^2 + y^2))/
      (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(2/3))
    (-1.1992115093851 4`*^7 (x^2 + y^2) (0.00033078981007580934` -
        1.` √(1 - 2.` u) - 0.000992369430227428` (x^2 + y^2))^2
      (1.` (-0.9000000000000001` - 1360.3804781558129` √(1 - 2.` u))^(2/3) u (x^2 + y^2) -
        0.5` (0.45` - 1360.3804781558129` √(1 - 2.` u) - 1.35` (x^2 + y^2))^(2/3))^2 +
     1.8126488072747894`*^10 (0.00033078981007580934` - 1.` √(1 - 2.` u) -
        0.000992369430227428` (x^2 + y^2))^2
```

$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.00033078981007580934` \left(x^2 + y^2\right)\right)$$
$$\left(1.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) - \right.$$
$$\left. 0.5` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\right)^2 +$$
$$0.5135140928089168` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(x^2 + y^2\right) \left(-2.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}\right.$$
$$\left. u \left(x^2 + y^2\right) + \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\right)$$
$$\left(-2.517567787881653`*^9 \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u}\right)^3 - \right.$$
$$7.495071933657125`*^6 \left(0.00033078981007580934` - 1.` \sqrt{1 - 2.` u}\right)^2 \left(x^2 + y^2\right) -$$
$$6335.972077010699` \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u}\right) \left(x^2 + y^2\right)^2 -$$
$$\left. 1.366875` \left(x^2 + y^2\right)^3 + 5.035135575763303`*^9 \right.$$
$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u}\right) \left(0.00033078981007580934` - 1.` \right.$$
$$\left. \sqrt{1 - 2.` u} - 0.000992369430227428` \left(x^2 + y^2\right)\right)^2 - 2.676178798525445`*^6$$
$$\left(\left(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u \right.\right.$$
$$\left.\left. \left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\right) \Big/$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Big)^{2.`}$$
$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.00033078981007580934` \right.$$
$$\left. \left(x^2 + y^2\right)\right)^3\Big) +$$
$$0.5` \left(x^2 + y^2\right) \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^2$$
$$\left(3.6` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) - \right.$$
$$1.8` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} -$$
$$0.02750318222593831` \left(\left(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u \right.\right.$$
$$\left.\left. \left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\right) \Big/$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Big)^{3.`}$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}$$
$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} + 0.00033078981007580934` \right.$$
$$\left. \left(x^2 + y^2\right)\right) - 388.09697061952363` \left(-0.9000000000000001` - \right.$$
$$1360.3804781558129` \sqrt{1 - 2.` u}\Big)^{2/3} u \left(-0.00033078981007580934` + \right.$$
$$\left. 1.` \sqrt{1 - 2.` u} + 0.0016539490503790467` \left(x^2 + y^2\right)\right)\Big)^2 -$$
$$4.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right)$$

$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right)^2 \left(0.02750318222593831`\right.$$
$$\left(\left(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u\right.\right.$$
$$\left.\left.\left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\right) \Big/$$
$$\left.\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\right)^{3.`}$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}$$
$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} +\right.$$
$$\left.0.00033078981007580934` \left(x^2 + y^2\right)\right) + 388.09697061952363`$$
$$\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} +\right.$$
$$\left.0.0016539490503790467` \left(x^2 + y^2\right)\right) -$$
$$1.` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^2$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right)$$
$$\left(-2.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) +\right.$$
$$\left.\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\right)$$
$$\left(0.02750318222593831`\right.$$
$$\left(\left(\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u\right.\right.$$
$$\left.\left.\left(1.35` - 4081.1414344674386` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\right) \Big/$$
$$\left.\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\right)^{3.`}$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}$$
$$\left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} +\right.$$
$$\left.0.00033078981007580934` \left(x^2 + y^2\right)\right) + 388.09697061952363`$$
$$\left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(-0.00033078981007580934` + 1.` \sqrt{1 - 2.` u} +\right.$$
$$\left.0.0016539490503790467` \left(x^2 + y^2\right)\right) +$$
$$2.` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(x^2 + y^2\right) \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)$$
$$\left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right)^2$$
$$\left(-3.6` \left(-0.9000000000000001` - 1360.3804781558129` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) +\right.$$
$$\left.1.8` \left(0.45` - 1360.3804781558129` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} +\right.$$

$$0.02750318222593831`\left(\left(\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\left(1.35`-4081.1414344674386`\sqrt{1-2.`\,u}-2.25`\left(x^2+y^2\right)\right)\right)\Big/\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,u}-1.35`\left(x^2+y^2\right)\right)^{5/3}\right)^{3.`}\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,u}-1.35`\left(x^2+y^2\right)\right)^{2/3}\left(-0.00033078981007580934`+1.`\sqrt{1-2.`\,u}+0.00033078981007580934`\left(x^2+y^2\right)\right)+388.09697061952363`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\left(-0.00033078981007580934`+1.`\sqrt{1-2.`\,u}+0.0016539490503790467`\left(x^2+y^2\right)\right)-1.`\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,u}-1.35`\left(x^2+y^2\right)\right)\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,u}-0.45`\left(x^2+y^2\right)\right)\left(-2.`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\left(x^2+y^2\right)+\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,u}-1.35`\left(x^2+y^2\right)\right)^{2/3}\right)\left(7.402540181389752`*^6\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\left(0.00033078981007580934`-1.`\sqrt{1-2.`\,u}-0.00033078981007580934`\left(x^2+y^2\right)\right)^2+4897.369721360927`\left(-0.00033078981007580934`+1.`\sqrt{1-2.`\,u}+0.000992369430227428`\left(x^2+y^2\right)\right)\left(1.`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\left(x^2+y^2\right)-0.5`\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,u}-1.35`\left(x^2+y^2\right)\right)^{2/3}\right)+\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,u}-1.35`\left(x^2+y^2\right)\right)\left(0.02750318222593831`\left(\left(\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\left(1.35`-4081.1414344674386`\sqrt{1-2.`\,u}-2.25`\left(x^2+y^2\right)\right)\right)\Big/\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,u}-1.35`\left(x^2+y^2\right)\right)^{5/3}\right)^{3.`}\left(0.45`-1360.3804781558129`\sqrt{1-2.`\,u}-1.35`\left(x^2+y^2\right)\right)^{2/3}\left(-0.00033078981007580934`+1.`\sqrt{1-2.`\,u}+0.00033078981007580934`\left(x^2+y^2\right)\right)+388.09697061952363`\left(-0.9000000000000001`-1360.3804781558129`\sqrt{1-2.`\,u}\right)^{2/3}u\left(-0.00033078981007580934`+1.`\sqrt{1-2.`\,u}+0.0016539490503790467`\left(x^2+y^2\right)\right)\right)\right)\Big/\left(\left(0.00033078981007580934`-1.`\sqrt{1-2.`\,u}-0.000992369430227428`\left(x^2+y^2\right)\right)^2\right.$$

```
(0.00033078981007580934` - 1.` Sqrt[1 - 2.` u] - 0.00033078981007580934` (x^2 + y^2))^2
(1.` (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) -
   0.5` (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))^2)

Π4c[x_, y_] := -((0.010751839448809199`
   (-0.81` + 3.4626706825649696` Sqrt[1 - 2.` u] + 2.43` (x^2 + y^2) + 8.051852388522243`*^-6
      (((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
          (1.35` - 5.771117804274949` Sqrt[1 - 2.` u] - 2.25` (x^2 + y^2)))/
        (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(5/3))^3.`
      (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.2339234868849825` (x^2 + y^2))
      (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.7017704606549475` (x^2 + y^2)) +
     (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
      (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(1/3)
      (-0.8337139082933227` + 3.56404531838759` Sqrt[1 - 2.` u] +
        4.1685695414666135` (x^2 + y^2)))/
   ((-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.2339234868849825` (x^2 + y^2))
     (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] +
       0.7017704606549475` (x^2 + y^2)))) + (0.00036317455583588634`
   (1 - (2.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2))/
      (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))
   (-23.980176511789907` (x^2 + y^2)
      (0.2339234868849825` - 1.` Sqrt[1 - 2.` u] - 0.7017704606549475` (x^2 + y^2))^2
      (1.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) -
        0.5` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))^2 +
     51.25645319142468` (0.2339234868849825` - 1.` Sqrt[1 - 2.` u] -
        0.7017704606549475` (x^2 + y^2))^2
      (-0.23392348688498252` + 1.` Sqrt[1 - 2.` u] + 0.23392348688498252` (x^2 + y^2))
      (1.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) -
        0.5` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3))^2 +
```

$$0.26514436682670883` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(x^2 + y^2\right) \left(-2.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3}$$
$$u \left(x^2 + y^2\right) + \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\Bigg)$$
$$\Bigg(-7.118951832142317` \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u}\right)^3 -$$
$$14.987610319868688` \left(0.2339234868849825` - 1.` \sqrt{1 - 2.` u}\right)^2 \left(x^2 + y^2\right) -$$
$$8.95966039113686` \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u}\right) \left(x^2 + y^2\right)^2 - 1.366875`$$
$$\left(x^2 + y^2\right)^3 + 14.237903664284634` \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u}\right)$$
$$\left(0.2339234868849825` - 1.` \sqrt{1 - 2.` u} - 0.7017704606549475` \left(x^2 + y^2\right)\right)^2 -$$
$$0.0015773056131510555`$$
$$\Bigg(\Bigg(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\Bigg) \Big/$$
$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Bigg)^{2.`}$$
$$\left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.2339234868849825` \left(x^2 + y^2\right)\right)^3\Bigg) +$$
$$0.5` \left(x^2 + y^2\right) \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^2$$
$$\Bigg(3.6` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) -$$
$$1.8` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} -$$
$$4.18559419245844`*^-6$$
$$\Bigg(\Bigg(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\Bigg) \Big/$$
$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Bigg)^{3.`}$$
$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}$$
$$\Bigg(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} +$$
$$0.2339234868849825` \left(x^2 + y^2\right)\Bigg) - 0.2833665511290421`$$
$$\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 1.1696174344249124` \left(x^2 + y^2\right)\right)\Bigg)^2 -$$
$$4.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(x^2 + y^2\right) \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)$$
$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right)^2 \Bigg(4.18559419245844`*^-6$$
$$\Bigg(\Bigg(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u$$
$$\left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\Bigg) \Big/$$

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Bigg)^{3.`}$$

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}$$

$$\left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.2339234868849825` \left(x^2 + y^2\right)\right) +$$

$$0.2833665511290421` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3}$$

$$u \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 1.1696174344249124` \left(x^2 + y^2\right)\right)\Bigg) -$$

$$1.` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^2$$

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right)$$

$$\Bigg(-2.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) +$$

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\Bigg)$$

$$\Bigg(4.18559419245844` *^-6$$

$$\Bigg(\Bigg(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u$$

$$\left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\Bigg) \Big/$$

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Bigg)^{3.`}$$

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}$$

$$\left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.2339234868849825` \left(x^2 + y^2\right)\right) +$$

$$0.2833665511290421` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3}$$

$$u \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 1.1696174344249124` \left(x^2 + y^2\right)\right)\Bigg) +$$

$$2.` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u$$

$$\left(x^2 + y^2\right) \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)$$

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 0.45` \left(x^2 + y^2\right)\right)^2$$

$$\Bigg(-3.6` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) +$$

$$1.8` \left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} +$$

$$4.18559419245844` *^-6$$

$$\Bigg(\Bigg(\left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3} u$$

$$\left(1.35` - 5.771117804274949` \sqrt{1 - 2.` u} - 2.25` \left(x^2 + y^2\right)\right)\Bigg) \Big/$$

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{5/3}\Bigg)^{3.`}$$

$$\left(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}$$

$$\left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.2339234868849825` \left(x^2 + y^2\right)\right) +$$

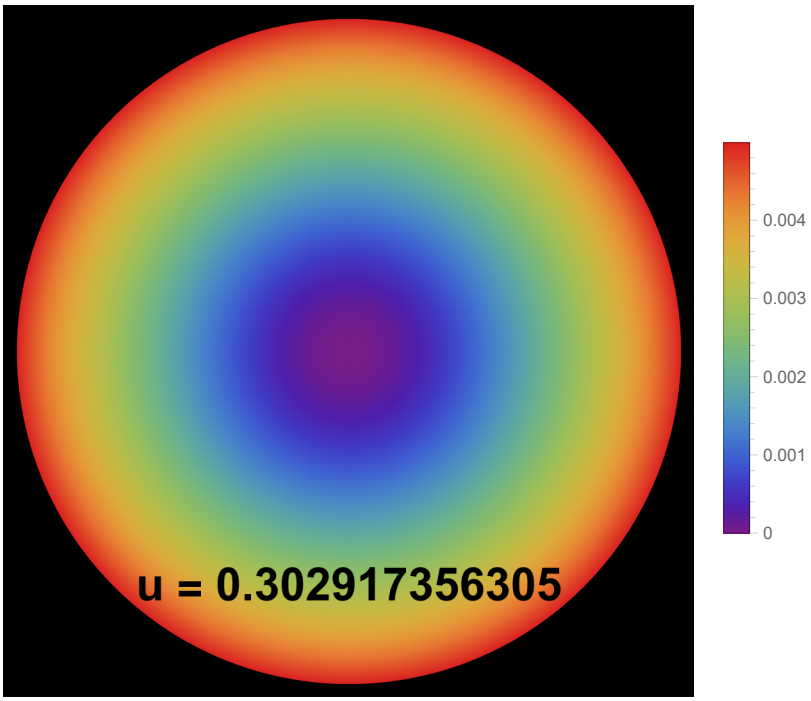
$$0.2833665511290421` \left(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\right)^{2/3}$$

$$u \left(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 1.1696174344249124` \left(x^2 + y^2\right)\right)\Bigg) -$$

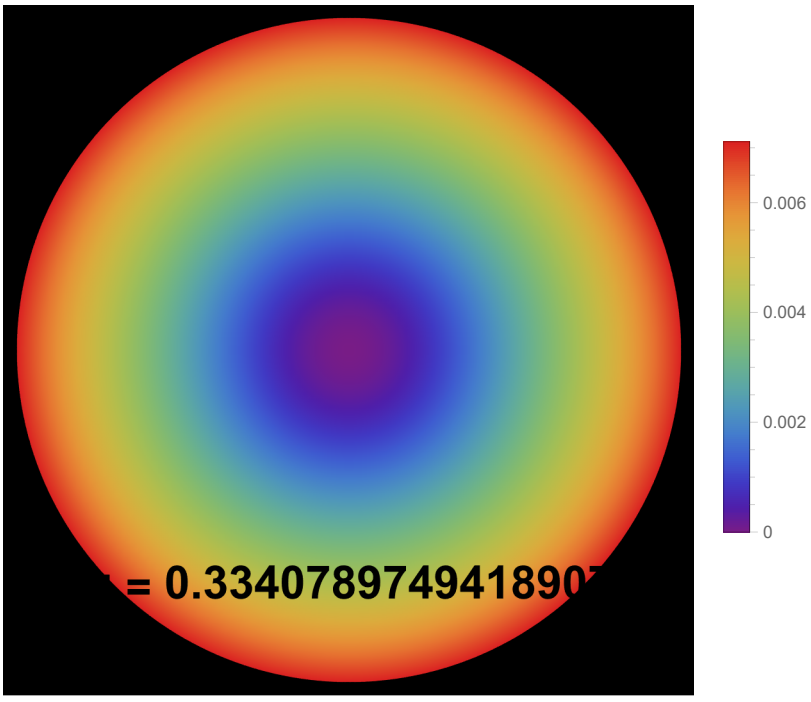
$$\frac{1.`\left(0.45`-1.9237059347583163`\sqrt{1-2.`u}-1.35`\left(x^2+y^2\right)\right)\left(0.45`-1.9237059347583163`\sqrt{1-2.`u}-0.45`\left(x^2+y^2\right)\right)\left(-2.`\left(-0.9000000000000001`-1.9237059347583163`\sqrt{1-2.`u}\right)^{2/3}u\left(x^2+y^2\right)+\left(0.45`-1.9237059347583163`\sqrt{1-2.`u}-1.35`\left(x^2+y^2\right)\right)^{2/3}\right)\left(14.80257809369747`\left(-0.9000000000000001`-1.9237059347583163`\sqrt{1-2.`u}\right)^{2/3}u\left(0.2339234868849825`-1.`\sqrt{1-2.`u}-0.2339234868849825`\left(x^2+y^2\right)\right)^2+6.925341365129939`\left(-0.2339234868849825`+1.`\sqrt{1-2.`u}+0.7017704606549475`\left(x^2+y^2\right)\right)\left(1.`\left(-0.9000000000000001`-1.9237059347583163`\sqrt{1-2.`u}\right)^{2/3}u\left(x^2+y^2\right)-0.5`\left(0.45`-1.9237059347583163`\sqrt{1-2.`u}-1.35`\left(x^2+y^2\right)\right)^{2/3}\right)+\left(0.45`-1.9237059347583163`\sqrt{1-2.`u}-1.35`\left(x^2+y^2\right)\right)\left(4.18559419245844`*^-6\left(\left(\left(-0.9000000000000001`-1.9237059347583163`\sqrt{1-2.`u}\right)^{2/3}u\left(1.35`-5.771117804274949`\sqrt{1-2.`u}-2.25`\left(x^2+y^2\right)\right)\right)\Big/\left(0.45`-1.9237059347583163`\sqrt{1-2.`u}-1.35`\left(x^2+y^2\right)\right)^{5/3}\right)^{3.`}\left(0.45`-1.9237059347583163`\sqrt{1-2.`u}-1.35`\left(x^2+y^2\right)\right)^{2/3}\left(-0.2339234868849825`+1.`\sqrt{1-2.`u}+0.2339234868849825`\left(x^2+y^2\right)\right)+0.2833665511290421`\left(-0.9000000000000001`-1.9237059347583163`\sqrt{1-2.`u}\right)^{2/3}u\left(-0.2339234868849825`+1.`\sqrt{1-2.`u}+1.1696174344249124`\left(x^2+y^2\right)\right)\right)\right)\Big/\left(\left(0.2339234868849825`-1.`\sqrt{1-2.`u}-0.7017704606549475`\left(x^2+y^2\right)\right)^2\left(0.2339234868849825`-1.`\sqrt{1-2.`u}-0.2339234868849825`\left(x^2+y^2\right)\right)^2\left(1.`\left(-0.9000000000000001`-1.9237059347583163`\sqrt{1-2.`u}\right)^{2/3}u\left(x^2+y^2\right)-0.5`\left(0.45`-1.9237059347583163`\sqrt{1-2.`u}-1.35`\left(x^2+y^2\right)\right)^{2/3}\right)^2\right)$$

In[ ]:=
```
DensityPlot[Re[Π1c[x, y]] /. {u → 0.302917356305}, {x, -1, 1},
 {y, -1, 1}, RegionFunction → Function[{x, y}, 0 < x^2 + y^2 < 1],
 ColorFunction → "Rainbow", MeshStyle → Opacity[0.1, Black],
 PlotLegends → Automatic, Background → Black, Frame → False,
 Epilog → Text[Style["u = 0.302917356305", Large, Bold], {0, -0.7}], PlotPoints → 100]
DensityPlot[Re[Π2c[x, y]] /. {u → 0.3340789749418907}, {x, -1, 1},
 {y, -1, 1}, RegionFunction → Function[{x, y}, 0 < x^2 + y^2 < 1],
 ColorFunction → "Rainbow", MeshStyle → Opacity[0.1, Black],
 PlotLegends → Automatic, Background → Black, Frame → False, Epilog →
  Text[Style["u = 0.3340789749418907", Large, Bold], {0, -0.7}], PlotPoints → 100]
DensityPlot[Re[Π3c[x, y]] /. {u → 0.0007712244935388194}, {x, -1, 1},
 {y, -1, 1}, RegionFunction → Function[{x, y}, 0 < x^2 + y^2 < 1],
 ColorFunction → "Rainbow", MeshStyle → Opacity[0.1, Black],
 PlotLegends → Automatic, Background → Black, Frame → False, Epilog →
  Text[Style["u = 0.0007712244935388194", Large, Bold], {0, -0.7}], PlotPoints → 100]
DensityPlot[Re[Π4c[x, y]] /. {u → 0.17642618727114115`}, {x, -1, 1},
 {y, -1, 1}, RegionFunction → Function[{x, y}, 0 < x^2 + y^2 < 1],
 ColorFunction → "Rainbow", MeshStyle → Opacity[0.1, Black],
 PlotLegends → Automatic, Background → Black, Frame → False, Epilog →
  Text[Style["u=0.17642618727114115`", Large, Bold], {0, -0.7}], PlotPoints → 100]
```

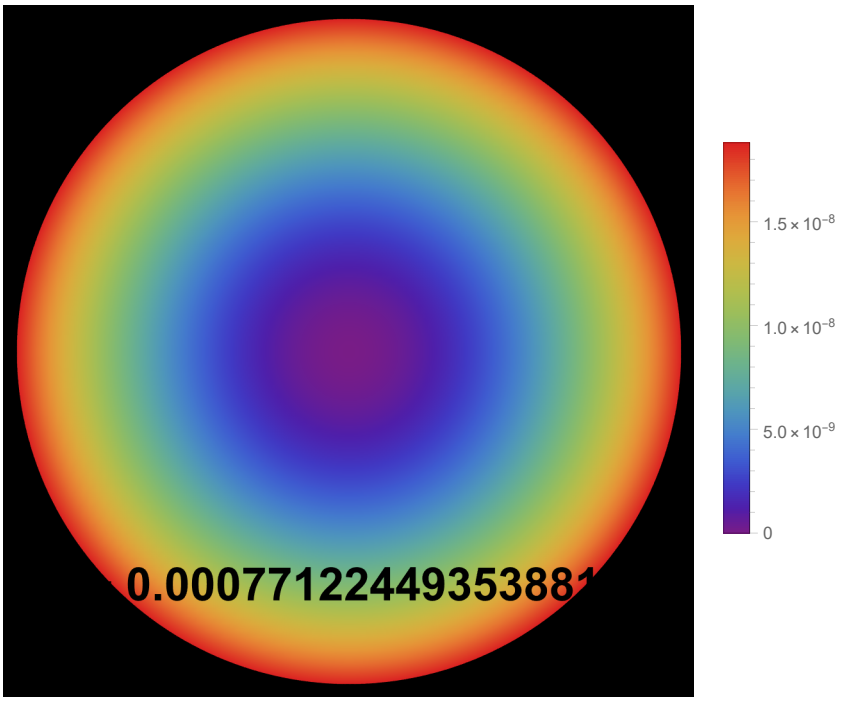
Out[ ]=


u = 0.302917356305
0.004
0.003
0.002
0.001
0

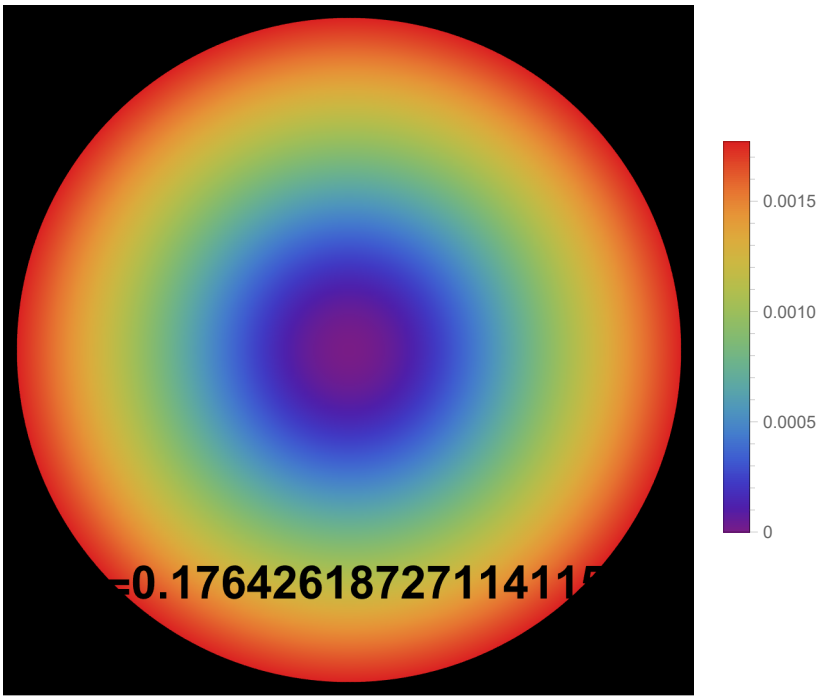
Out[ ]=


= 0.334078974941890
0.006
0.004
0.002
0

Out[ ]=



Out[ ]=



In[ ]:=

```
DEnergy1[x_] :=
 -(((7.714814869352783`*^-9 x ((0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
      (((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3)
        u (-0.5951163415647547` + 3.0000000000000004`
          Sqrt[1 - 2.` u] + 0.991860569274591` x^2)))/
      ((0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
```

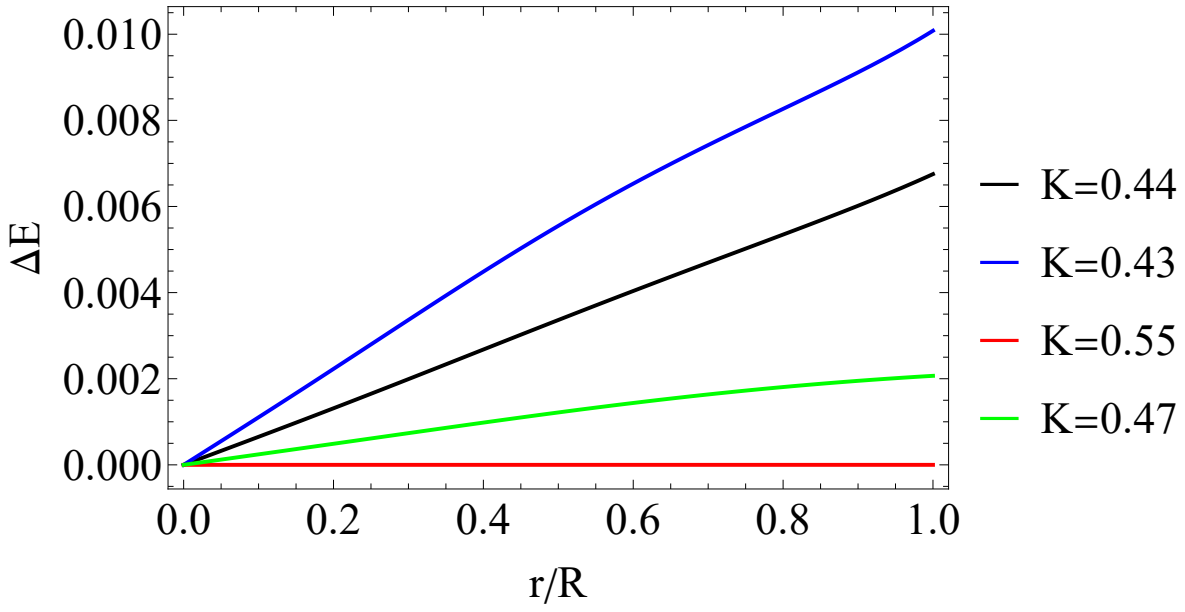
```
                    (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.5951163415647547` x^2))))^3.`
          (-1.` + 5.041031123615297` Sqrt[1 - 2.` u] + 1.` x^2) +
         (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
          (-58244.88020934214` + 293614.25392653834` Sqrt[1 - 2.` u] + 291224.4010467107` x^2))
        (10.164797915703241` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u^2 +
         (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
          (0.21703679999999986` - 1.0940892637698683` Sqrt[1 - 2.` u] - 0.6511104` x^2) +
         (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
          (-5.28239895785162` + 2.016412449446119` Sqrt[1 - 2.` u] -
            1.243704182508828`*^-16 Sqrt[1 - 2.` u] x^2 + 1.` x^4))))/
       ((0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
         (0.1983721138549182` - 1.` Sqrt[1 - 2.` u] - 0.1983721138549182` x^2)^2
         (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.5951163415647547` x^2)
         (-2.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u x^2 +
           1.` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3))))

DEnergy2[x_] :=
 -(((1.0265369805565476`*^-8 x ((0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
          (-1.` + 4.274902077240703` Sqrt[1 - 2.` u] + 1.` x^2)
          (((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
              (-0.7017704606549475` + 3.` Sqrt[1 - 2.` u] + 1.1696174344249126` x^2))/
            ((0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
              (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.7017704606549475` x^2)))^3.` +
         (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
          (-67700.43585200135` + 289412.7338538216` Sqrt[1 - 2.` u] + 338502.1792600068` x^2))
        (7.309915107998749` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u^2 +
         (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3) (0.21590139999999994` -
            0.9229573433391758` Sqrt[1 - 2.` u] - 0.6477041999999998` x^2) +
         (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
          (-3.8549575539993746` + 1.7099608308962808` Sqrt[1 - 2.` u] -
            1.0546877142601192`*^-16 Sqrt[1 - 2.` u] x^2 + 0.9999999999999999` x^4))))/
```

```
    ((0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
      (0.2339234868849825` - 1.` Sqrt[1 - 2.` u] - 0.2339234868849825` x^2)^2
      (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.7017704606549475` x^2)
      (-2.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u x^2 +
        1.` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)))))
DEnergy3[x_] :=
 -(((2.660938384176462`*^-10 x ((0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
          (-0.0003307898100758094` + 1.` Sqrt[1 - 2.` u] + 0.0003307898100758094` x^2)
          (((-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u
              (-0.000992369430227428` + 3.` Sqrt[1 - 2.` u] + 0.0016539490503790465` x^2))/
            ((0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
              (-0.00033078981007580934` + 1.` Sqrt[1 - 2.` u] +
                0.000992369430227428` x^2)))^3.` +
          (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u
           (-4.667769792877099` + 14110.984228345349` Sqrt[1 - 2.` u] +
             23.338848964385495` x^2)))
       (-5183.697745982449` (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3)
         u^2 + (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
          (-0.00033078981007580934` + 1.` Sqrt[1 - 2.` u] + 0.000992369430227428` x^2) +
         (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u
          (2591.8491565962486` - 1.7147143928839352` Sqrt[1 - 2.` u] +
            2.1152393329287684`*^-16 Sqrt[1 - 2.` u] x^2 - 0.001418025120890834` x^4)))/
     ((0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
       (0.00033078981007580934` - 1.` Sqrt[1 - 2.` u] - 0.00033078981007580934` x^2)^2
       (-0.00033078981007580934` + 1.` Sqrt[1 - 2.` u] + 0.000992369430227428` x^2)
       (1.` (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u x^2 -
         0.5` (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)))))
DEnergy4[x_] :=
 -(((1.0265369805565476`*^-8 x ((0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` x^2)^(2/3)
          (-1.` + 4.274902077240703` Sqrt[1 - 2.` u] + 1.` x^2)
```

$$\Bigg(\Big(\Big(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\Big)^{2/3} u \Big(-0.7017704606549475` + 3.` \sqrt{1 - 2.` u} + 1.1696174344249126` x^2\Big)\Big) \Big/ \Big(\Big(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\Big)^{2/3} \Big(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.7017704606549475` x^2\Big)\Big)\Big)^{3.`} + \Big(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\Big)^{2/3} u \Big(-67700.43585200135` + 289412.7338538216` \sqrt{1 - 2.` u} + 338502.1792600068` x^2\Big)\Big) \Big(7.309915107998749` \Big(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\Big)^{2/3} u^2 + \Big(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\Big)^{2/3} \Big(0.21590139999999994` - 0.9229573433391758` \sqrt{1 - 2.` u} - 0.6477041999999998` x^2\Big) + \Big(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\Big)^{2/3} u \Big(-3.8549575539993746` + 1.7099608308962808` \sqrt{1 - 2.` u} - 1.0546877142601192`*^-16 \sqrt{1 - 2.` u} x^2 + 0.9999999999999999` x^4\Big)\Big)\Big) \Big/ \Big(\Big(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\Big)^{2/3} \Big(0.2339234868849825` - 1.` \sqrt{1 - 2.` u} - 0.2339234868849825` x^2\Big)^2 \Big(-0.2339234868849825` + 1.` \sqrt{1 - 2.` u} + 0.7017704606549475` x^2\Big) \Big(-2.` \Big(-0.9000000000000001` - 1.9237059347583163` \sqrt{1 - 2.` u}\Big)^{2/3} u x^2 + 1.` \Big(0.45` - 1.9237059347583163` \sqrt{1 - 2.` u} - 1.35` x^2\Big)^{2/3}\Big)\Big)\Big)$$

In[ ]:=
```
solu1 := Re[DEnergy1[x]] /. {u → 0.302917356305}
         parte real
solu2 := Re[DEnergy2[x]] /. {u → 0.3340789749418907}
         parte real
solu3 := Re[DEnergy3[x]] /. {u → 0.0007712244935388194`}
         parte real
solu4 := Re[DEnergy4[x]] /. {u → 0.17642618727114115}
         parte real
Plot[{solu1, solu2, solu3, solu4}, {x, 0, 1}, Evaluated → True,
 representación gráfica                                evaluado  verdadero
 PlotStyle → {{Black, Thickness[0.005]}, {Blue, Thickness[0.005]
  estilo de represe··  negro  grosor                   azul  grosor
    }, {Red, Thickness[0.005]}, {Green, Thickness[0.005]}, {Pink, Thickness[0.005]}},
       rojo  grosor                verde  grosor                rosa  grosor
 Frame → True, FrameLabel → {"r/R", "ΔE"}, ImageSize → 500,
  marco  verd···  etiqueta de marco                tamaño de imagen
 LabelStyle → {FontSize → 23, FontFamily → "Times", Black},
  estilo de etiqueta  tamaño de tipo de·  familia de tipo de··  multipli···  negro
 PlotRange → Full, PlotLegends → {"K=0.44", "K=0.43", "K=0.55", "K=0.47"}]
  rango de rep···  comp··  leyendas de representación
```

Out[ ]=



In[ ]:=

```
dEnergy1c[x_, y_] := -((7.714814869352783`*^-9
 Sqrt[x^2 + y^2] ((0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
  (((-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
     (-0.5951163415647547` + 3.0000000000000004` Sqrt[1 - 2.` u] +
      0.991860569274591` (x^2 + y^2)))/((0.45` - 2.2684640056268837`
       Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3) (-0.1983721138549182` +
      1.` Sqrt[1 - 2.` u] + 0.5951163415647547` (x^2 + y^2))))^3.`
  (-1.` + 5.041031123615297` Sqrt[1 - 2.` u] + 1.` (x^2 + y^2)) +
 (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
  (-58244.88020934214` + 293614.25392653834` Sqrt[1 - 2.` u] +
    291224.4010467107` (x^2 + y^2)))
 (10.164797915703241` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u^2 +
  (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
   (0.21703679999999986` - 1.0940892637698683` Sqrt[1 - 2.` u] - 0.6511104` (x^2 + y^2)) +
  (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u
   (-5.28239895785162` + 2.016412449446119` Sqrt[1 - 2.` u] -
    1.243704182508828`*^-16 Sqrt[1 - 2.` u] (x^2 + y^2) + 1.` (x^2 + y^2)^2))))/
 ((0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
  (0.1983721138549182` - 1.` Sqrt[1 - 2.` u] - 0.1983721138549182` (x^2 + y^2))^2)
```

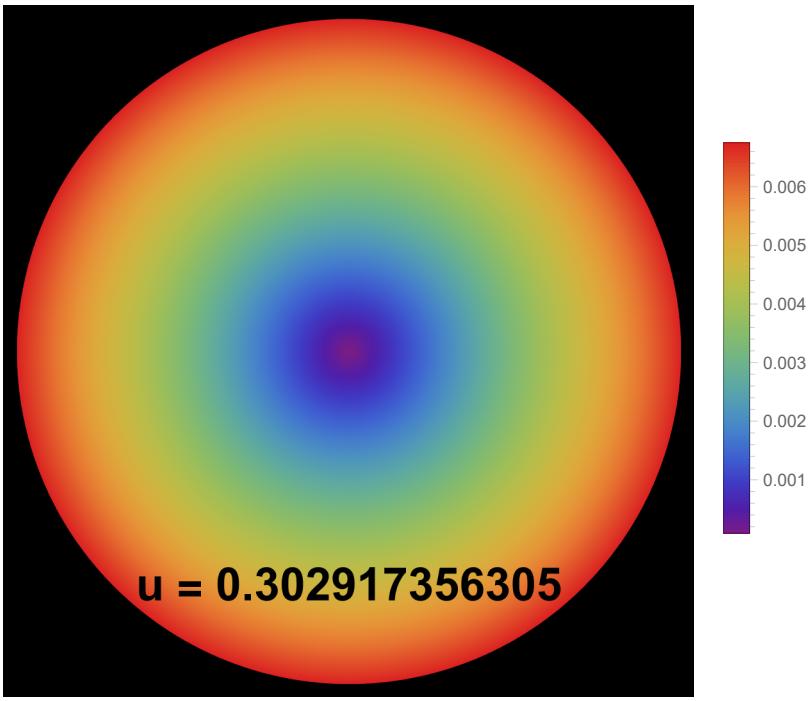
```
      (-0.1983721138549182` + 1.` Sqrt[1 - 2.` u] + 0.5951163415647547` (x^2 + y^2))
      (-2.` (-0.9000000000000001` - 2.2684640056268837` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) +
        1.` (0.45` - 2.2684640056268837` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)))
dEnergy2c[x_, y_] :=
 -(((1.0265369805565476`*^-8 Sqrt[x^2 + y^2] ((0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] -
              1.35` (x^2 + y^2))^(2/3) (-1.` + 4.274902077240703` Sqrt[1 - 2.` u] + 1.` (x^2 + y^2))
          (((-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
              (-0.7017704606549475` + 3.` Sqrt[1 - 2.` u] + 1.1696174344249126` (x^2 + y^2)))) /
          ((0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
            (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] +
              0.7017704606549475` (x^2 + y^2)))^3.` +
        (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
         (-67700.43585200135` + 289412.7338538216` Sqrt[1 - 2.` u] +
           338502.1792600068` (x^2 + y^2)))
       (7.309915107998749` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u^2 +
         (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
          (0.21590139999999994` - 0.9229573433391758` Sqrt[1 - 2.` u] -
            0.6477041999999998` (x^2 + y^2)) +
         (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u
          (-3.8549575539993746` + 1.7099608308962808` Sqrt[1 - 2.` u] -
            1.0546877142601192`*^-16 Sqrt[1 - 2.` u] (x^2 + y^2) +
            0.9999999999999999` (x^2 + y^2)^2))) /
      ((0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
        (0.2339234868849825` - 1.` Sqrt[1 - 2.` u] - 0.2339234868849825` (x^2 + y^2))^2
        (-0.2339234868849825` + 1.` Sqrt[1 - 2.` u] + 0.7017704606549475` (x^2 + y^2))
        (-2.` (-0.9000000000000001` - 1.9237059347583163` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) +
          1.` (0.45` - 1.9237059347583163` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)))
dEnergy3c[x_, y_] := -((2.660938384176462`*^-10
      Sqrt[x^2 + y^2] ((0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
        (-0.0003307898100758094` + 1.` Sqrt[1 - 2.` u] + 0.0003307898100758094` (x^2 + y^2))
```

```
(((-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u
      (-0.000992369430227428` + 3.` Sqrt[1 - 2.` u] + 0.0016539490503790465`
        (x^2 + y^2)))/((0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] -
      1.35` (x^2 + y^2))^(2/3) (-0.00033078981007580934` +
     1.` Sqrt[1 - 2.` u] + 0.000992369430227428` (x^2 + y^2)))^3.` +
   (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u
    (-4.667769792877099` + 14110.984228345349` Sqrt[1 - 2.` u] +
      23.338848964385495` (x^2 + y^2)))
  (-5183.697745982449` (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3)
    u^2 + (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
    (-0.00033078981007580934` + 1.` Sqrt[1 - 2.` u] + 0.000992369430227428` (x^2 + y^2)) +
   (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u
    (2591.8491565962486` - 1.7147143928839352` Sqrt[1 - 2.` u] +
      2.1152393329287684`*^-16 Sqrt[1 - 2.` u] (x^2 + y^2) -
      0.001418025120890834` (x^2 + y^2)^2)))/
 ((0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
   (0.00033078981007580934` - 1.` Sqrt[1 - 2.` u] - 0.00033078981007580934` (x^2 + y^2))^2
   (-0.00033078981007580934` + 1.` Sqrt[1 - 2.` u] + 0.000992369430227428` (x^2 + y^2))
   (1.` (-0.9000000000000001` - 1360.3804781558129` Sqrt[1 - 2.` u])^(2/3) u (x^2 + y^2) -
     0.5` (0.45` - 1360.3804781558129` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)))))

dEnergy4c[x_, y_] := -(((1.5065536126488855`*^-9
   Sqrt[x^2 + y^2] ((0.45` - 4.762131609592578` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
     (((-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3) u
         (-0.2834864952662446` + 3.` Sqrt[1 - 2.` u] + 0.4724774921104076` (x^2 + y^2)))/
       ((0.45` - 4.762131609592578` Sqrt[1 - 2.` u] - 1.35` (x^2 + y^2))^(2/3)
         (-0.09449549842208152` + 1.` Sqrt[1 - 2.` u] + 0.2834864952662446`
           (x^2 + y^2)))^3.` (-1.` + 10.582514687983506` Sqrt[1 - 2.` u] + 1.` (x^2 + y^2)) +
      (-0.9000000000000001` - 4.762131609592578` Sqrt[1 - 2.` u])^(2/3) u
       (-37978.13208878246` + 401904.14065171813` Sqrt[1 - 2.` u] +
         189890.66044391232` (x^2 + y^2)))
```

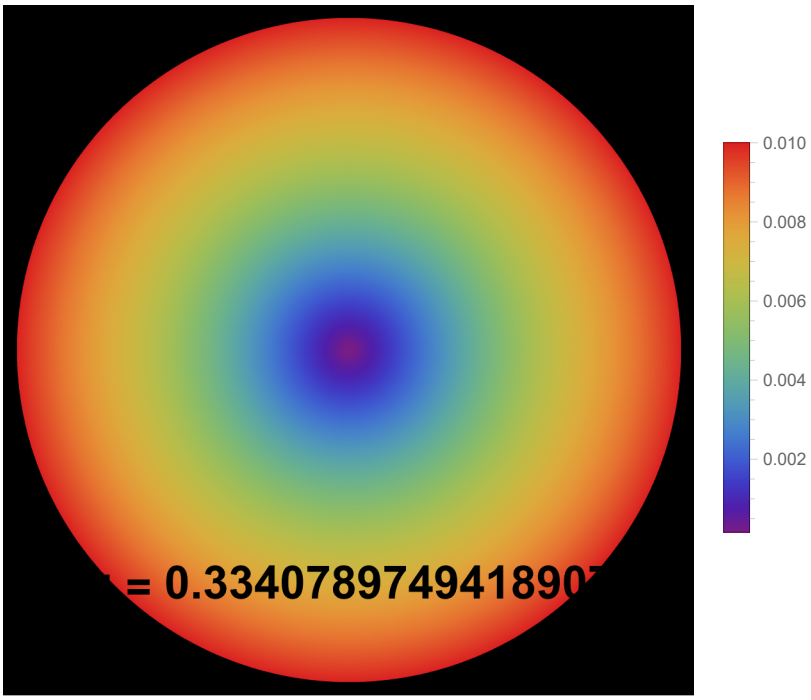
$$\Big(44.79584684855467` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u^2 + \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} \left(0.22076460000000006` - 2.3362446220868036` \sqrt{1 - 2.` u} - 0.6622938` \left(x^2 + y^2\right)\right) + \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(-22.59792342427733` + 4.233005875193405` \sqrt{1 - 2.` u} - 1.0443512413362841`*^-15 \sqrt{1 - 2.` u} \left(x^2 + y^2\right) + 1.` \left(x^2 + y^2\right)^2\right)\Big) \Big/ \Big(\left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3} \left(0.09449549842208152` - 1.` \sqrt{1 - 2.` u} - 0.09449549842208152` \left(x^2 + y^2\right)\right)^2 \left(-0.09449549842208152` + 1.` \sqrt{1 - 2.` u} + 0.2834864952662446` \left(x^2 + y^2\right)\right) \Big(-2.` \left(-0.9000000000000001` - 4.762131609592578` \sqrt{1 - 2.` u}\right)^{2/3} u \left(x^2 + y^2\right) + 1.` \left(0.45` - 4.762131609592578` \sqrt{1 - 2.` u} - 1.35` \left(x^2 + y^2\right)\right)^{2/3}\Big)\Big)$$

In[ ]:=
```
DensityPlot[Re[dEnergy1c[x, y]] /. {u → 0.302917356305}, {x, -1, 1},
 {y, -1, 1}, RegionFunction → Function[{x, y}, 0 < x^2 + y^2 < 1],
  ColorFunction → "Rainbow", MeshStyle → Opacity[0.1, Black],
  PlotLegends → Automatic, Background → Black, Frame → False,
  Epilog → Text[Style["u = 0.302917356305", Large, Bold], {0, -0.7}], PlotPoints → 100]
DensityPlot[Re[dEnergy2c[x, y]] /. {u → 0.3340789749418907},
  {x, -1, 1}, {y, -1, 1}, RegionFunction → Function[{x, y}, 0 < x^2 + y^2 < 1],
  ColorFunction → "Rainbow", MeshStyle → Opacity[0.1, Black],
  PlotLegends → Automatic, Background → Black, Frame → False, Epilog →
   Text[Style["u = 0.3340789749418907", Large, Bold], {0, -0.7}], PlotPoints → 100]
DensityPlot[Re[dEnergy3c[x, y]] /. {u → 0.0007712244935388194},
  {x, -1, 1}, {y, -1, 1}, RegionFunction → Function[{x, y}, 0 < x^2 + y^2 < 1],
  ColorFunction → "Rainbow", MeshStyle → Opacity[0.1, Black],
  PlotLegends → Automatic, Background → Black, Frame → False, Epilog →
   Text[Style["u = 0.0007712244935388194", Large, Bold], {0, -0.7}], PlotPoints → 100]
DensityPlot[Re[dEnergy4c[x, y]] /. {u → 0.17642618727114115`},
  {x, -1, 1}, {y, -1, 1}, RegionFunction → Function[{x, y}, 0 < x^2 + y^2 < 1],
  ColorFunction → "Rainbow", MeshStyle → Opacity[0.1, Black],
  PlotLegends → Automatic, Background → Black, Frame → False, Epilog →
   Text[Style["u = 0.17642618727114115`", Large, Bold], {0, -0.7}], PlotPoints → 100]
```

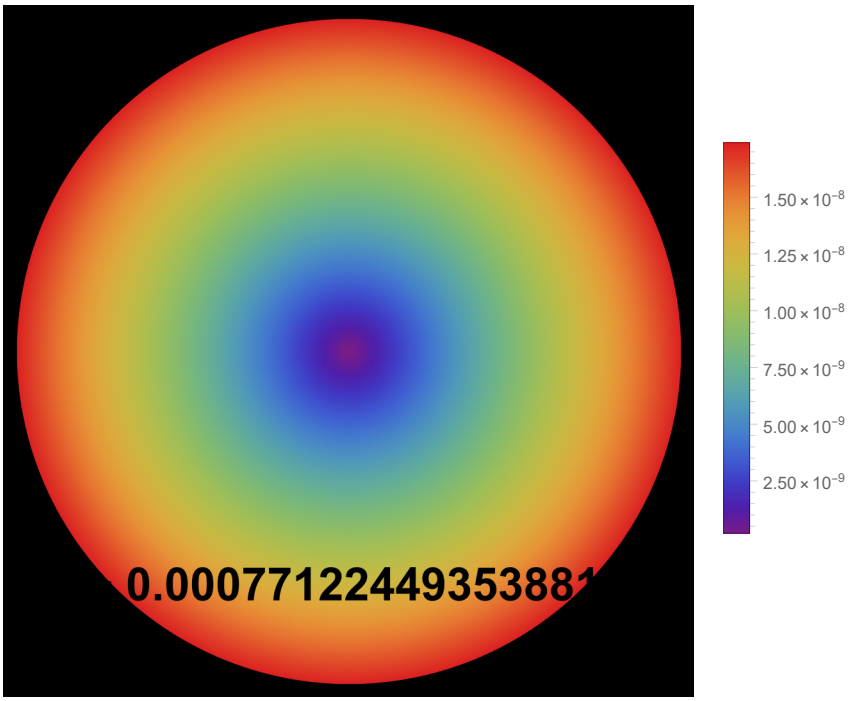
Out[ ]=


u = 0.302917356305
0.006
0.005
0.004
0.003
0.002
0.001

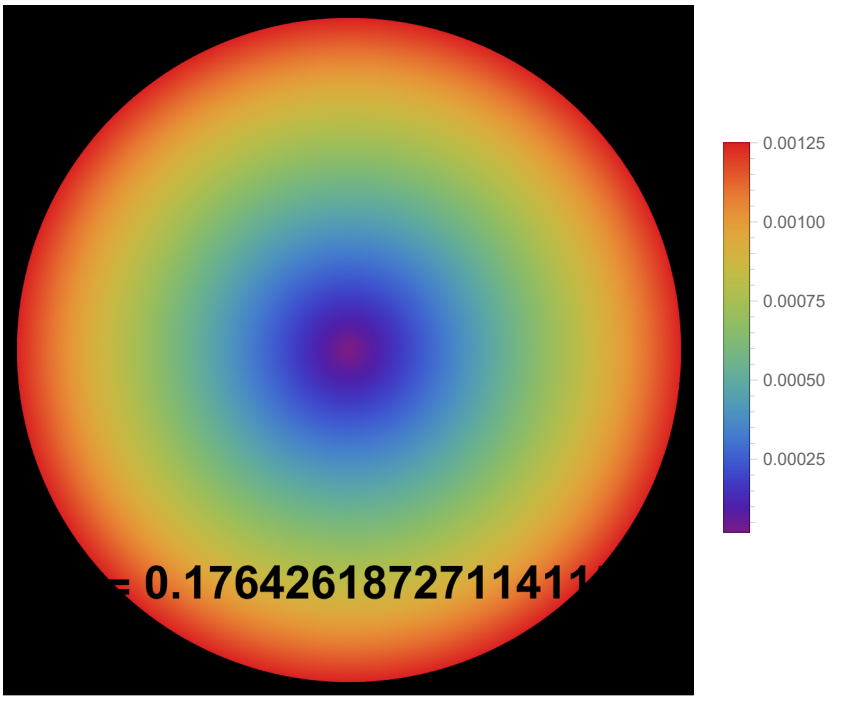
Out[ ]=


= 0.334078974941890
0.010
0.008
0.006
0.004
0.002

Out[ ]=


0.0007712244935388
1.50 × 10^-8
1.25 × 10^-8
1.00 × 10^-8
7.50 × 10^-9
5.00 × 10^-9
2.50 × 10^-9

Out[ ]=


= 0.17642618727114
0.00125
0.00100
0.00075
0.00050
0.00025