```
> restart;
  Digits:=15:
  with(plots):
  with(orthopoly):
Warning, the name changecoords has been redefined
> N:=12;
```

$$N := 12$$

```
>
> f:=1/sqrt(1+z^2);
```

$$f := \frac{1}{\sqrt{1+z^2}}$$

```
> Fi:=convert(series(f,z,2*N),polynom);
  Fo:=convert(series(f,z=infinity,2*N),polynom);
```

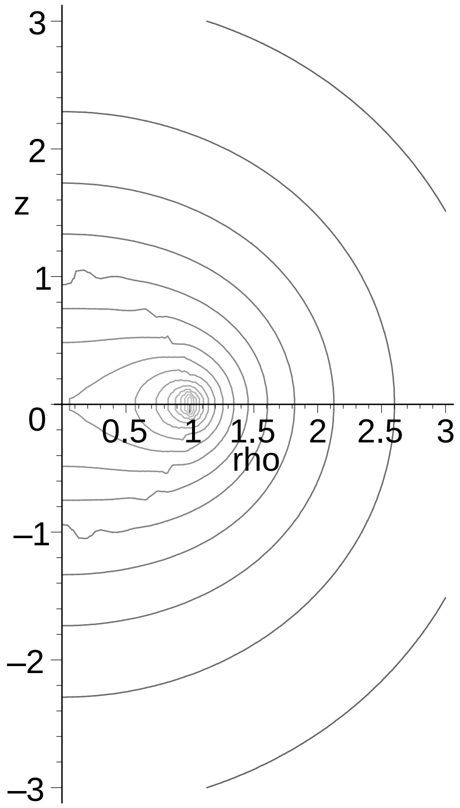
$$Fi := 1 - \frac{1}{2}z^2 + \frac{3}{8}z^4 - \frac{5}{16}z^6 + \frac{35}{128}z^8 - \frac{63}{256}z^{10} + \frac{231}{1024}z^{12} - \frac{429}{2048}z^{14} + \frac{6435}{32768}z^{16} - \frac{12155}{65536}z^{18} + \frac{46189}{262144}z^{20} - \frac{88179}{524288}z^{22}$$

$$Fo := \frac{1}{z} - \frac{1}{2}\frac{1}{z^3} + \frac{\frac{3}{8}}{z^5} - \frac{5}{16}\frac{1}{z^7} + \frac{\frac{35}{128}}{z^9} - \frac{63}{256}\frac{1}{z^{11}} + \frac{\frac{231}{1024}}{z^{13}} - \frac{429}{2048}\frac{1}{z^{15}} + \frac{\frac{6435}{32768}}{z^{17}} - \frac{12155}{65536}\frac{1}{z^{19}} + \frac{\frac{46189}{262144}}{z^{21}} - \frac{88179}{524288}\frac{1}{z^{23}}$$

```
> SLi:=[seq(z^(2*i)=(rho^2+z^2)^(i)*P(2*i,z/sqrt(rho^2+z^2)),i=0..
  N)]:
> Gi:=(subs(SLi,Fi)):
> SLo:=[seq(z^(-2*i-1)=(rho^2+z^2)^(-(2*i+1)/2)*P(2*i,z/sqrt(rho^2
  +z^2)),i=0..N)]:
> Go:=(subs(SLo,Fo)):

> GiF:=unapply(Gi,rho,z):
  GoF:=unapply(Go,rho,z):
> G:=(rho,z)->
    if type(rho,float) and type(z,float) then
        if rho^2+z^2>1 then
          GoF(rho,z)
        else
          GiF(rho,z)
        fi
    else
     'G(rho,z)'
    fi:

>
> contourplot(Re(G(rho,z)),rho=0..3,z=-3..3,levels=[i/10$i=0..20],
  scaling=constrained,grid=[70,70]);
```


3
2
z
1
0
–1
–2
–3
0.5
1
1.5
2
2.5
3
rho

>
>
>