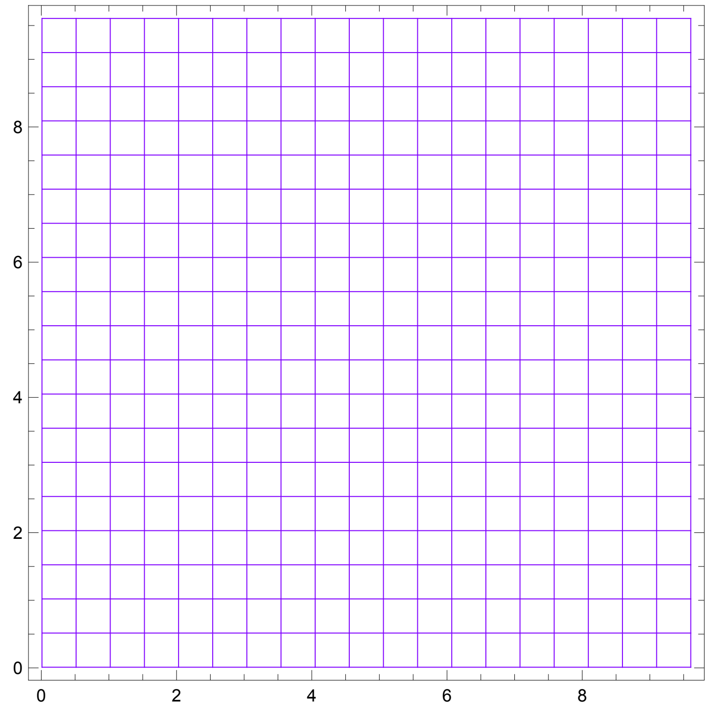
Gauss Plane and Complex Function

Graphics primitives

```
b[x__]:=Map[{Re[#], Im[#]}&, x, {2}]

bl[x__]:=Map[Line, b[x]]

c[x__]:=Map[{Re[#], Im[#]}&, Transpose[x], {2}]

cl[x__]:=Map[Line, c[x]]

a = Table[N[i/10] + I N[j/10], (*I = Sqrt[-1]*){j, 0.1, 101, 10.1/2}, {i, 0.1, 101, 10.1/2}];

plt[clr_, x__]:=Show[Graphics[{Hue[clr], bl[x]}], Graphics[{Hue[clr], cl[x]}],
AspectRatio->Automatic, Frame->True]

plt[.75, a]
```

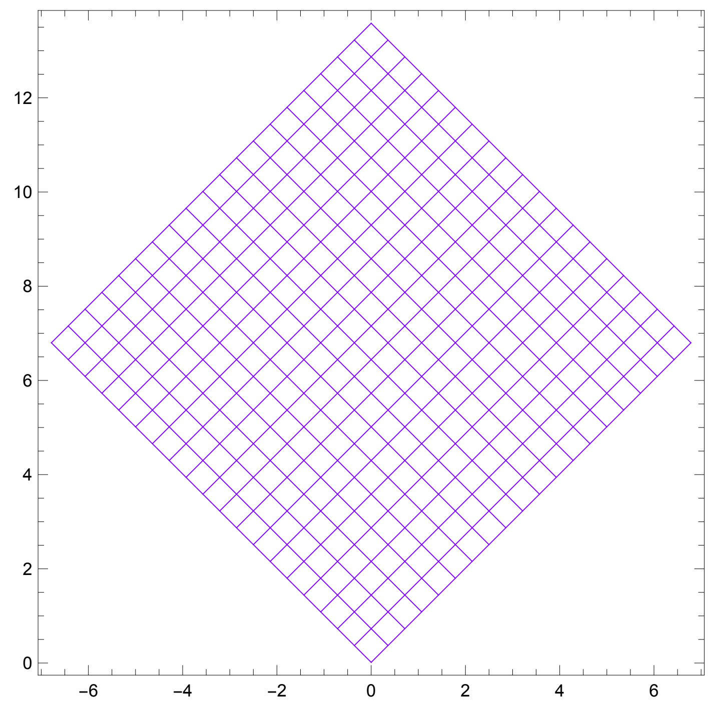


$r = \text{Exp}[I\text{Pi} * .25]$ (*$I = \text{Sqrt}[-1]$*)

$0.707107 + 0.707107i$

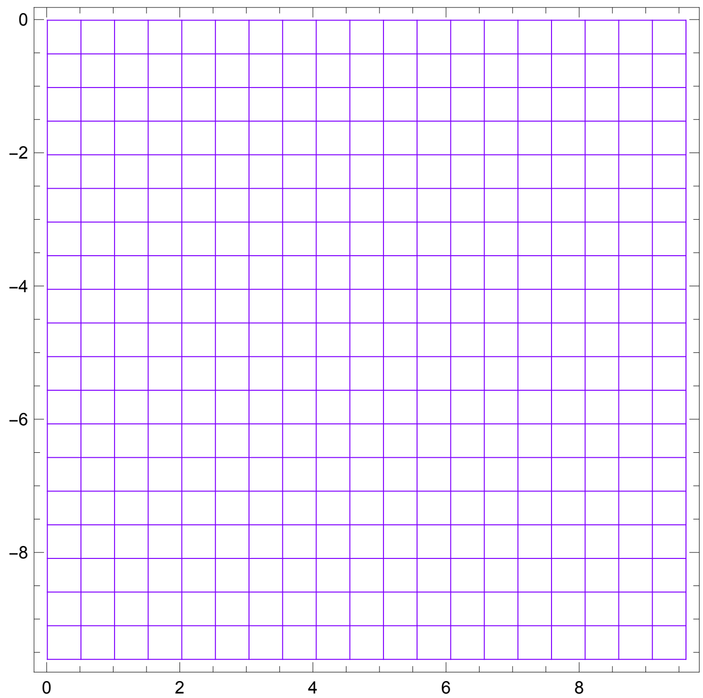
plt$[.75, r * a]$

(*RotateofAngle = Pi/4aroundzero.$r$actstoeachelementof$a$*)



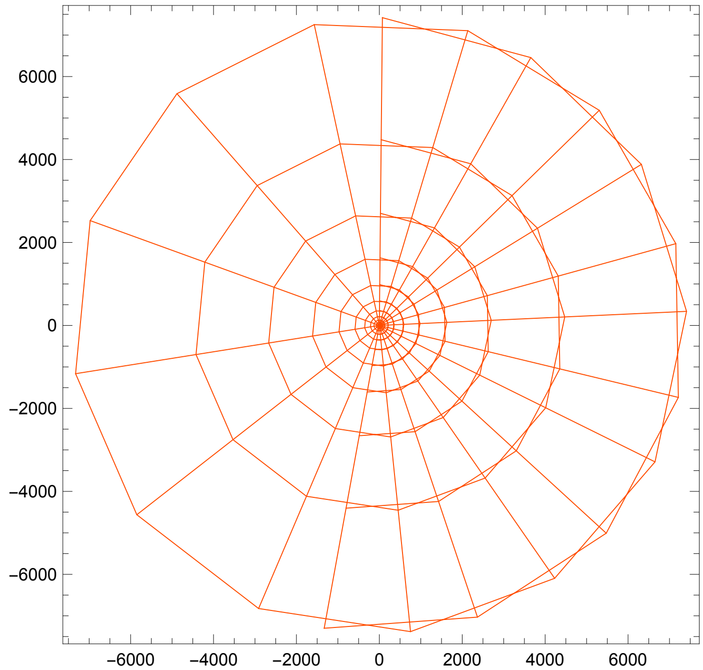
plt[.75, Conjugate[a]]

(*Conjugate acts to each element of a*)

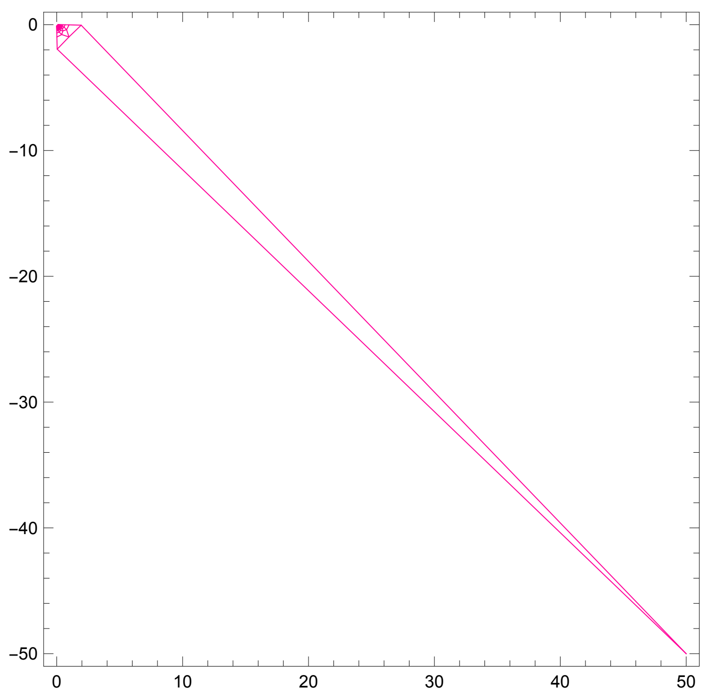


Function acts to each element of List .

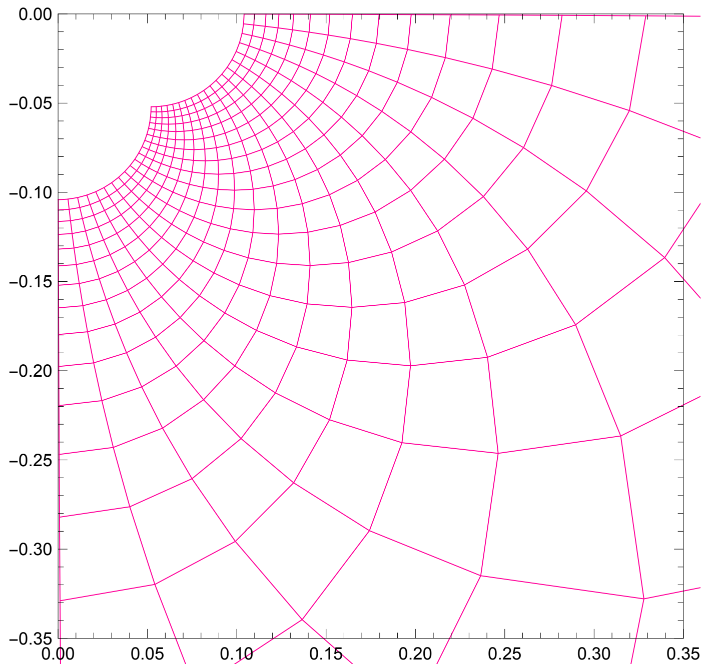
```
plt[.05, Sin[a]]   (*sine function*)
```



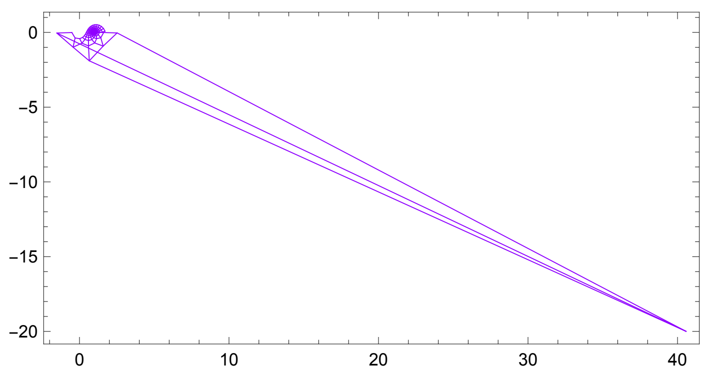
$\mathbf{g1 = plt[.9, 1/}a\mathbf{]\ (*1/}a\mathbf{isinverseofeachelementof}a\mathbf{*)}$



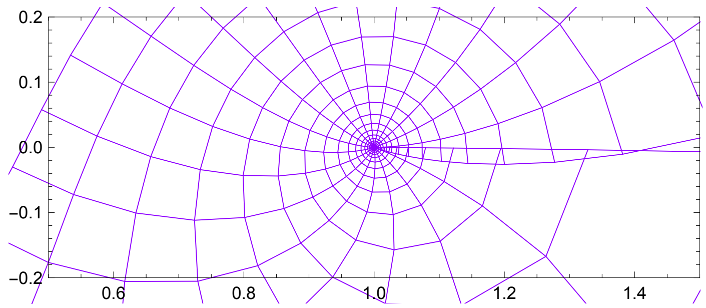
```
Show[g1, PlotRange->{{0, 0.35}, {−0.35, 0}}]
```




```
g2 = plt[.76, Zeta[a]]    (*Riemann'sZetafunction*)
```



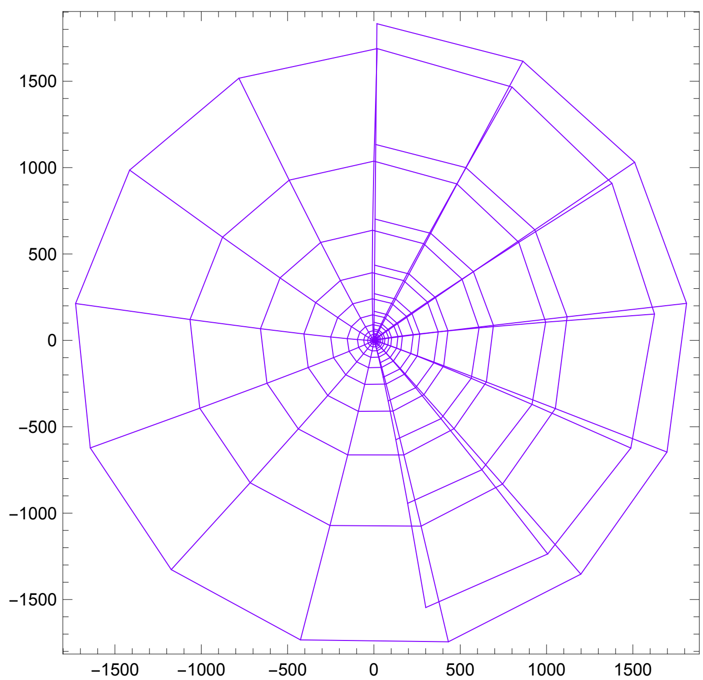

```
Show[g2, PlotRange->{{0.5, 1.5}, {−0.2, 0.2}}]
```



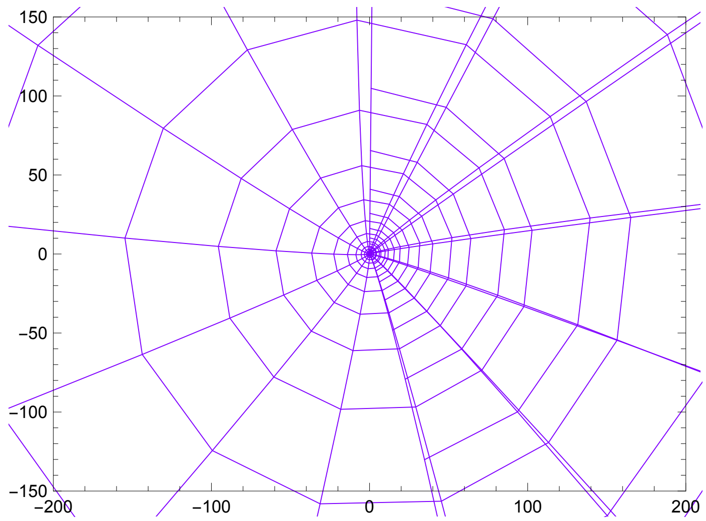
?BesselJ

□

g3 = plt[.75, BesselJ[1, a]]

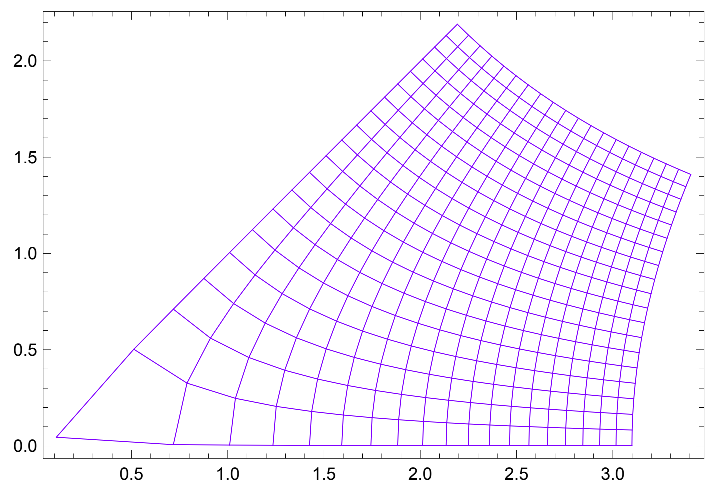


Show[g3, PlotRange->{{−200, 200}, {−0150, 150}}]

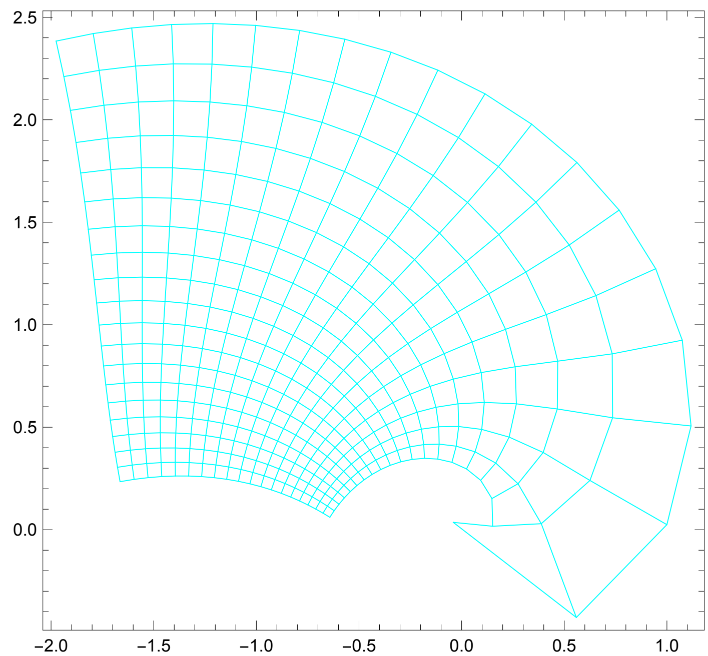


plt[.75, Sqrt[a]]

(*Square Root of each element of a*)



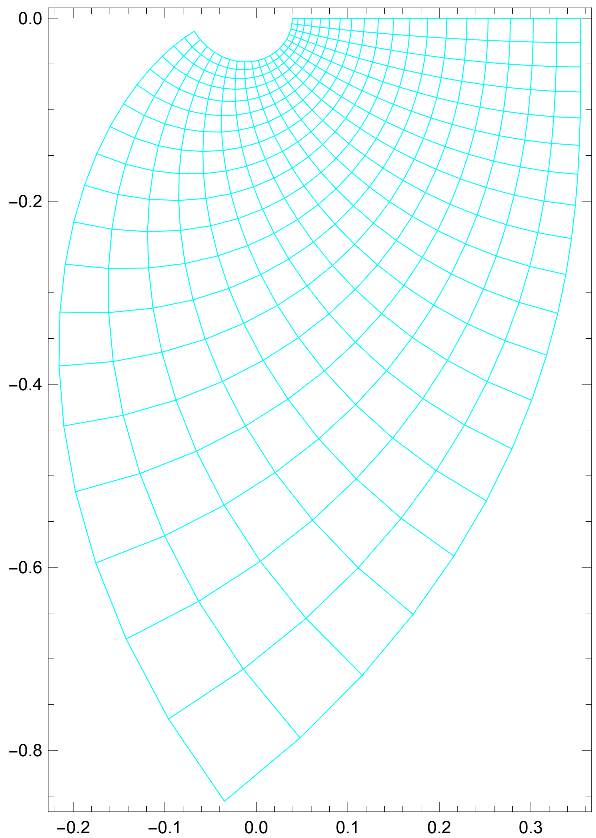
plt[.5, a^(.5 + I)]   (*Power by “1/2 + Sqrt[-1]”*)



?AiryAi

□

plt[.5, AiryAi[Evaluate[a/5]]]



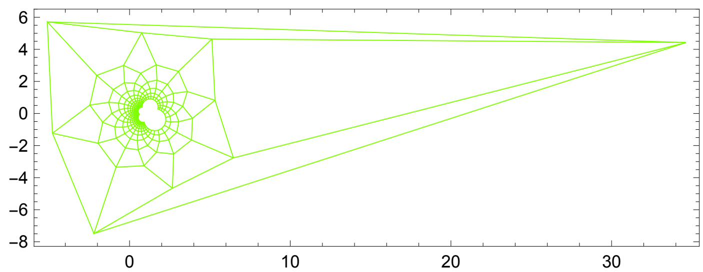
$\mathbf{a1 = 4 + 4}\boldsymbol{I}$

$4 + 4i$

$\mathbf{a2 = 6 + 7}\boldsymbol{I}$

$6 + 7i$

$\mathbf{g4 = plt[.25, (}\boldsymbol{a}\mathbf{ - a1)/(}\boldsymbol{a}\mathbf{ - a2)]}$



Show[g4, PlotRange->{{−1.5, 3}, {−3, 3}}]