Practical-7:
Make a plot of the vertical lines x=a, a=-1,-1/2,1/2,1 and the horizontal lines y=b, b=-1,-1/2,1/2,1 Find the plot of this grid under the mapping w=f(z)=1/z.

(%i1)
```
kill(all);
```
(%o0) *done*

(%i1)
```
f(z):=block(
[x,y],
x:realpart(z),
y:imagpart(z),
w:rectform(1/(x+%i·y)));
```
(%o1) f*(z)*:=block*([x,y],x:*#{Lisp function}*(z),y:*
#{Lisp function}*(z),w:*#{Lisp function}$\left(\frac{1}{x+\%i\,y}\right)$)

(%i2)
```
r(t,s):=(t+%i·s);
```
(%o2) r*(t,s)*:=$t+\%i\,s$

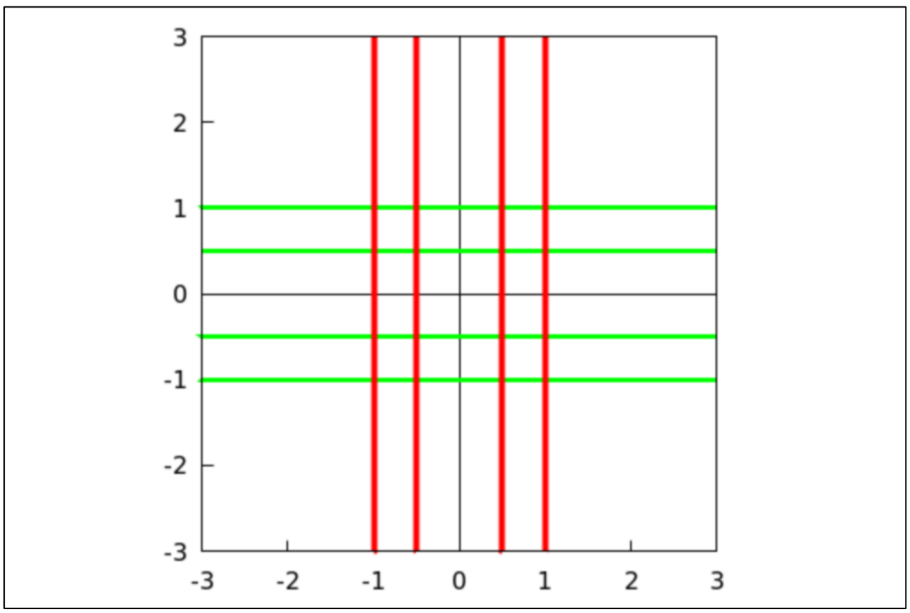
(%i4)
```
h:makelist(parametric(realpart(r(t,s)),imagpart(r(t,s)),t,−3,3),s,[−1,−1/2,1/2,1
v:makelist(parametric(realpart(r(t,s)),imagpart(r(t,s)),s,−3,3),t,[−1,−1/2,1/2,1
```

(h) *[*parametric*(t,−1,t,−3,3),*
parametric$\left(t,-\frac{1}{2},t,-3,3\right)$,parametric$\left(t,\frac{1}{2},t,-3,3\right)$,
parametric*(t,1,t,−3,3)]*
(v) *[*parametric*(−1,s,s,−3,3),*
parametric$\left(-\frac{1}{2},s,s,-3,3\right)$,parametric$\left(\frac{1}{2},s,s,-3,3\right)$,
parametric*(1,s,s,−3,3)]*

➔ ;

(%i5)
```
wxdraw2d(
xaxis=true,xaxis_type=solid,xrange=[−3,3],
yaxis=true,yaxis_type=solid,yrange=[−3,3],
proportional_axes=xy,
   line_width=3,
color=green,
h,
   line_width=4,
color=red,
v);
```

(%t5)



(%o5)

(%i6)
```
w(t,s):=f(r(t,s));
```

(%o6) $w(t,s):=f(r(t,s))$

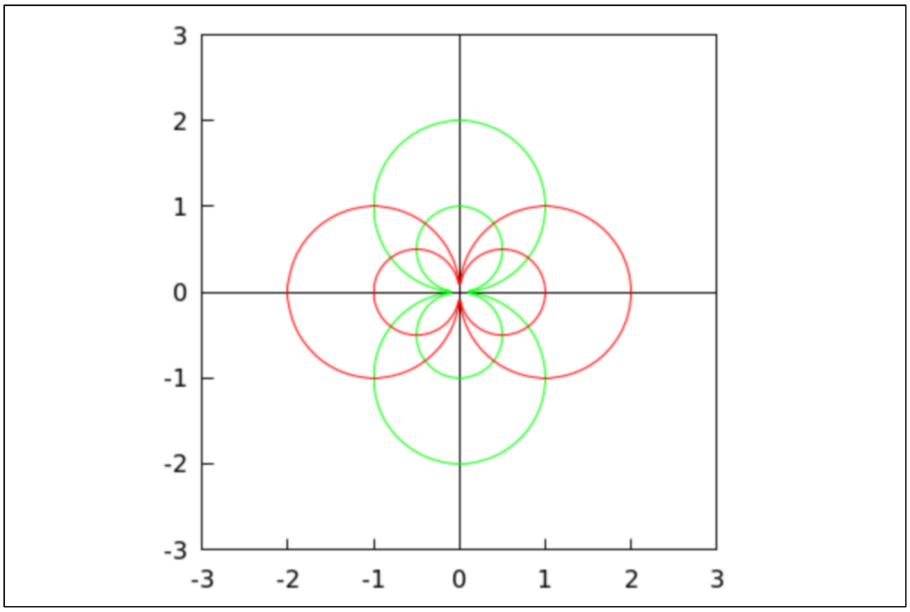
(%i8)
```
himage:makelist(parametric(realpart(w(t,s)),imagpart(w(t,s)),t,-10,10),s,[-1,-
vimage:makelist(parametric(realpart(w(t,s)),imagpart(w(t,s)),s,-10,10),t,[-1,-
```

(himage) $$[\text{parametric}\left(\frac{t}{t^2+1},\frac{1}{t^2+1},t,-10,10\right),\ \text{parametric}\left(\frac{t}{t^2+\frac{1}{4}},\frac{1}{2\left(t^2+\frac{1}{4}\right)},t,-10,10\right),\ \text{parametric}\left(\frac{t}{t^2+\frac{1}{4}},-\frac{1}{2\left(t^2+\frac{1}{4}\right)},t,-10,10\right),\ \text{parametric}\left(\frac{t}{t^2+1},-\frac{1}{t^2+1},t,-10,10\right)]$$

(vimage) $$[\text{parametric}\left(-\frac{1}{s^2+1},-\frac{s}{s^2+1},s,-10,10\right),\ \text{parametric}\left(-\frac{1}{2\left(s^2+\frac{1}{4}\right)},-\frac{s}{s^2+\frac{1}{4}},s,-10,10\right),\ \text{parametric}\left(\frac{1}{2\left(s^2+\frac{1}{4}\right)},-\frac{s}{s^2+\frac{1}{4}},s,-10,10\right),\ \text{parametric}\left(\frac{1}{s^2+1},-\frac{s}{s^2+1},s,-10,10\right)]$$

(%i9)
```
wxdraw2d(
xaxis=true,xaxis_type=solid,xrange=[−3,3],
yaxis=true,yaxis_type=solid,yrange=[−3,3],
proportional_axes=xy,
   nticks=600,
color=green,
himage,
color=red,
vimage);
```

(%t9)



(%o9)

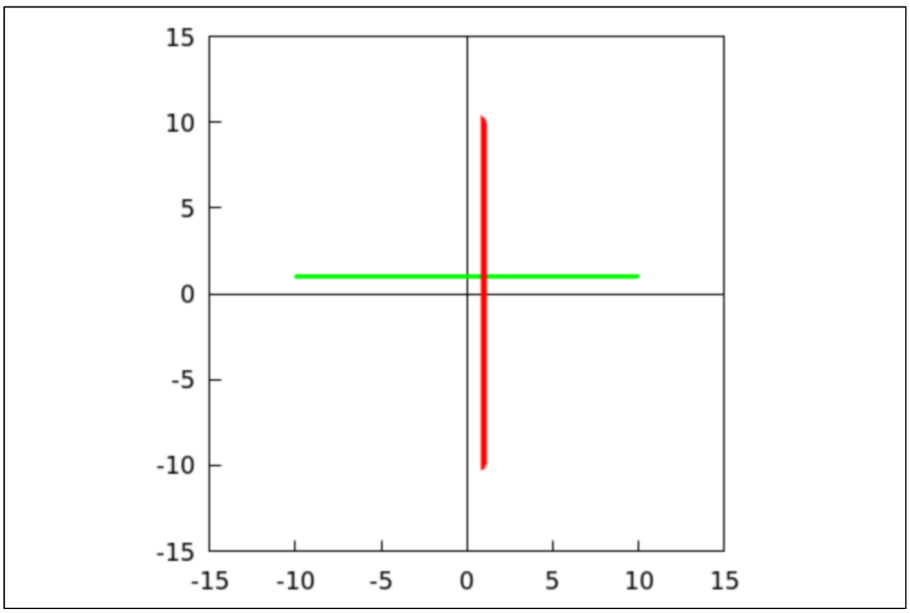
(%i11)
```
h1:makelist(parametric(realpart(r(t,s)),imagpart(r(t,s)),t,−10,10),s,1);
v1:makelist(parametric(realpart(r(t,s)),imagpart(r(t,s)),s,−10,10),t,1);
```

(h1) $[\text{parametric}(t,1,t,-10,10)]$

(v1) $[\text{parametric}(1,s,s,-10,10)]$

(%i12)
```
wxdraw2d(
xaxis=true,xaxis_type=solid,xrange=[−15,15],
yaxis=true,yaxis_type=solid,yrange=[−15,15],
proportional_axes=xy,
   line_width=3,
color=green,
h1,
   line_width=4,
color=red,
v1);
```

(%t12)



(%o12)

(%i13)
```
w1(t,s):=f(r(t,s));
```

(%o13) $w1(t,s):=f(r(t,s))$

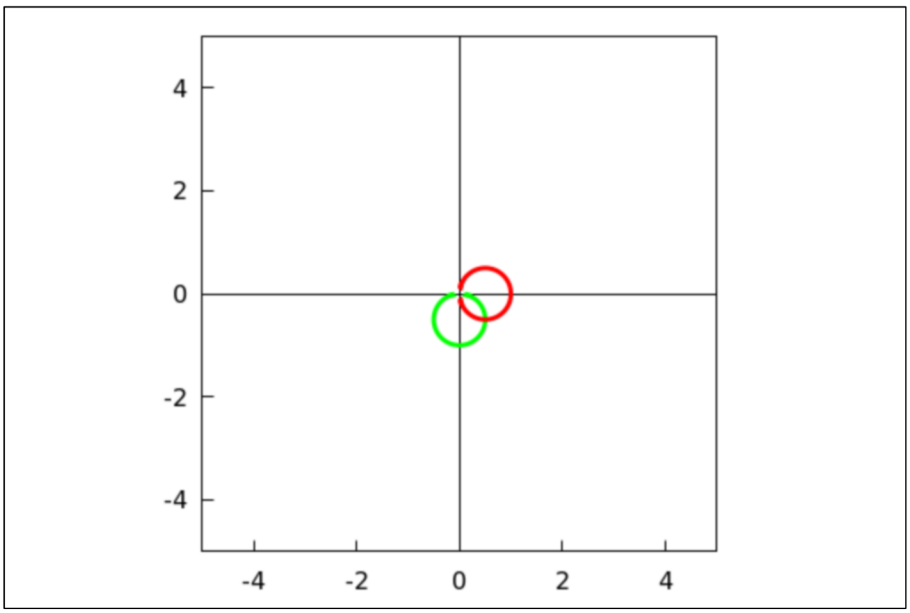
(%i15)
```
h1image:makelist(parametric(realpart(w(t,s)),imagpart(w(t,s)),t,−10,10),s,1);
v1image:makelist(parametric(realpart(w(t,s)),imagpart(w(t,s)),s,−10,10),t,1);
```

(h1image) $$\left[\text{parametric}\left(\frac{t}{t^2+1},-\frac{1}{t^2+1},t,-10,10\right)\right]$$

(v1image) $$\left[\text{parametric}\left(\frac{1}{s^2+1},-\frac{s}{s^2+1},s,-10,10\right)\right]$$

(%i16)
```
wxdraw2d(
xaxis=true,xaxis_type=solid,xrange=[−5,5],
yaxis=true,yaxis_type=solid,yrange=[−5,5],
proportional_axes=xy,
   nticks=600,
   line_width=3,
color=green,
h1image,
color=red,
v1image);
```

(%t16)



(%o16)