Practical 2

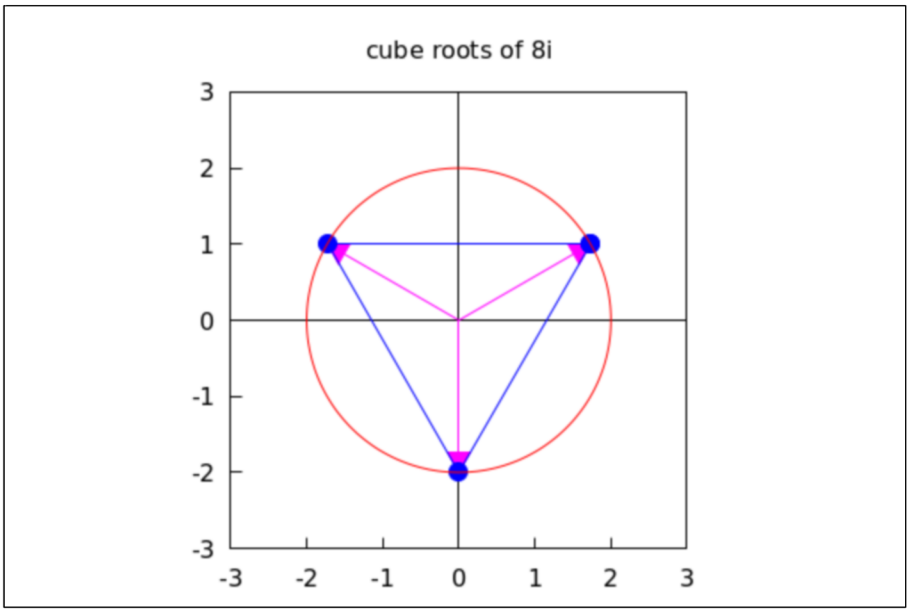
Find all the solutions of the equation
z^3=8i
and represent these geometrically.

1

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

(%i2) roots:solve(z^3=8·%i);
(roots) [z=(-1)^(1/6)*sqrt(3)*%i-(-1)^(1/6),z=-(-1)^(1/6)*sqrt(3)*%i-
(-1)^(1/6),z=2*(-1)^(1/6)]

(%i3) sol:map(rhs, roots);
(sol) [(-1)^(1/6)*sqrt(3)*%i-(-1)^(1/6),-(-1)^(1/6)*sqrt(3)*%i-(-1)^(1/6),2
(-1)^(1/6)]

(%i4) rsol:map(realpart, sol);
      isol:map(imagpart, sol);
(rsol) [-sqrt(3),0,sqrt(3)]
(isol) [1,-2,1]

(%i5) rsol1:cons(rsol[3], rsol);
      isol1:cons(isol[3], isol);
(rsol1) [sqrt(3),-sqrt(3),0,sqrt(3)]
(isol1) [1,1,-2,1]

(%i6) v:makelist(vector([0, 0], [rsol[k], isol[k]]), k, 1, 3);
(v) [vector([0,0],[-sqrt(3),1]),vector([0,0],[0,-2]),
vector([0,0],[sqrt(3),1])]
```

```
wxdraw2d(
  title = concat("cube roots of 8i"),
  xaxis = true,  xaxis_type = solid,  xrange = [−3,  3],
  yaxis = true,  yaxis_type = solid,  yrange = [−3,  3],
  proportional_axes = xy,
  color = magenta,
  head_length = 0.3,
  head_angle = 30,
  v,
  color = blue,
  point_size = 2,
  point_type = 7,
  points_joined = true,
  points(rsol1,  isol1),
  color = red,
  nticks = 200,
  parametric(2·cos(t),  2·sin(t),  t,  0,  2·%pi)
);
```

(%t9)



(%o9)

2

Exercise

Find all the solutions of the equations
and represent these geometrically.

Figure 1: