1) With Mathematica, plot the Re and Im part of z=x+ I y in the complex plane.

```
Plot3D[Im[Sqrt[x + I y]],{x,-4,4},{y,-4,4}]
Plot3D[Re[Sqrt[x + I y]],{x,-4,4},{y,-4,4}]
```

Comment on your answer.

2) In George Gamow's 123… Infinity, solve (by hand) the treasure hunter puzzle on Page 36. *[The answer is in the book, just work through it.]*

3) For each of the following numbers, plot the number and label it in five ways as in Figure 3.3. **Also** plot the complex conjugate of the number.

a) 1+I, b) I-1, c) 1- I$\sqrt{3}$, d) I- $\sqrt{3}$,

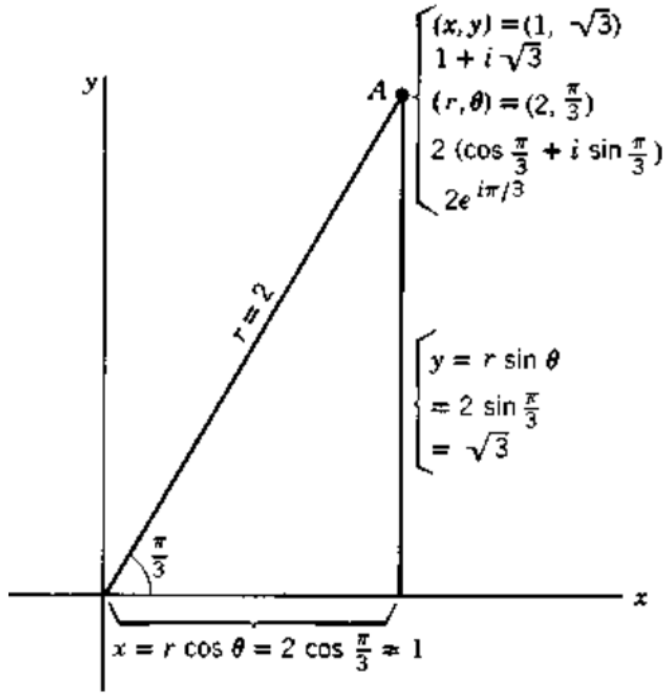

Figure 3.3

4) Compute the Re and Im part of:

a) (3+I)/(2+I) b) $[(1+I)/(1-I)]^3$ c) (3I - 7)/(I+4)

b) Convert this into polar form.

c) Compute the absolute value

5) Solve for all possible values of the real numbers x and y in the following equations.

a) x + Iy = 3 I – 4 b) (2x – 3y – 5) + I (x + 2y + 1) = 0

6) Show that multiplying two complex numbers $z_1=x_1+I\ y_1$, $z_2=x_2+I\ y_2$ can be represented as a rotation and rescaling of z_1 by z_2. Hint: convert to polar coordinates to show the property, but express the final result in terms of $\{x_1,x_2,y_1,y_2\}$.

7) Compute the Re and Im parts of ln[z] where a) z1= r Exp[Iθ] and b) z2= z1* Exp[2πI]