1.) a.) $3-i = 3.16\left(\cos(^-0.32) + i\sin(^-0.32)\right)$

b.) $2+0i = 2$

c.) $0-i = 1\left(\cos(^-1.57) + i\sin(^-1.57)\right)$

d.) $-5+12i = 13\left(\cos(^-1.18) + i\sin(^-1.18)\right)$

2.) a.) modulus $= \sqrt{-\sqrt{3}^2 + 1}$ argument $= \tan^{-1}\left(\frac{1}{-\sqrt{3}}\right)$

$= 2$ 2.62 rads

b.) modulus $= \sqrt{4^2+4^2}$ argument $= \tan^{-1}\left(\frac{4}{4}\right)$

$= 5.66$ $= 0.79$ rads

c.) $-10.93-2.93i$

modulus $= 11.3$ argument $= \tan^{-1}\left(\frac{-2.93}{^-10.93}\right)$

$= ^-2.88$ rads

d.) $z_4 = \frac{z_1}{z_2} = ^-0.092 + 0.342i$

modulus $= 0.329$ argument $= \tan^{-1}\left(\frac{0.342}{-0.092}\right)$

$= 1.83$ rads

3.) a.) $3e^{i\pi/4}$ modulus $= 3$ arg $= \frac{\pi}{4}$

b.) $2e^{-i\pi/6}$ modulus $= 2$ arg $= \frac{-\pi}{6}$

4.) a.) imaginary $= 5\sin\left(\frac{\pi}{3}\right)$

$= 4.33$

real $= 5\cos\left(\frac{\pi}{3}\right)$

$= 2.5$

$z = 2.5 + 4.33i$

b.) imaginary $= 11\sin(\pi)$

$= 0$

real $= 11\cos(\pi)$

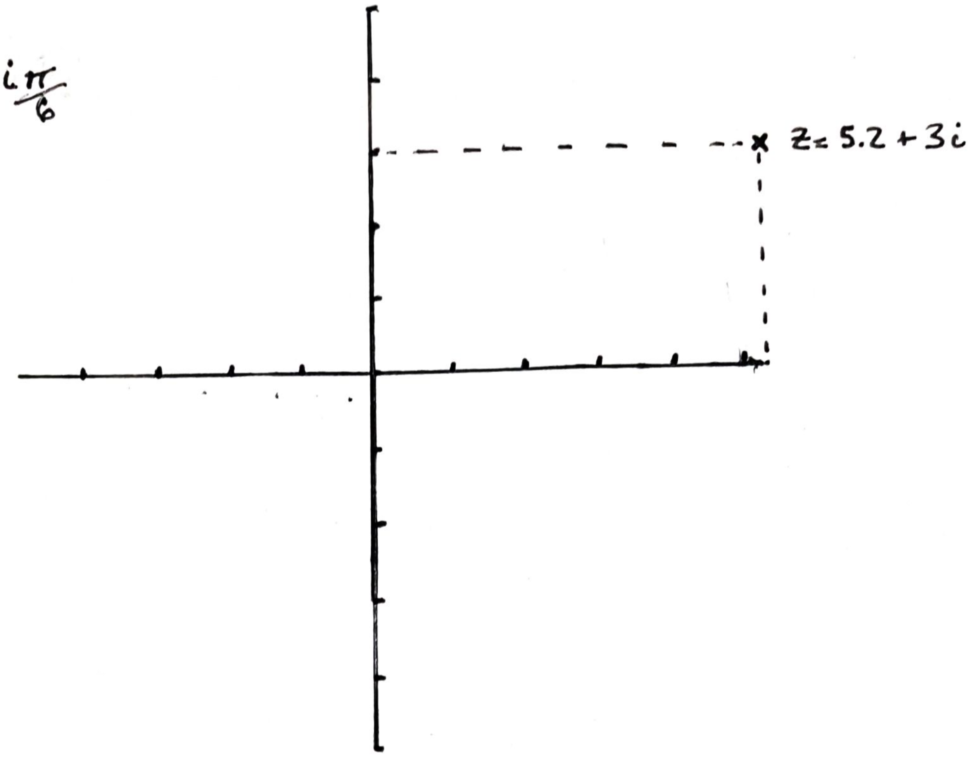
$= ^-11$

$z = ^-11 + 0i$

5.) $z = 6e^{\frac{i\pi}{6}}$

$\text{real} = 6\cos\frac{\pi}{6}$
$= 5.2$

$\text{img} = 6\sin\frac{\pi}{2}$
$= 3$



6.) a.) $\text{mod} = \sqrt{7^2+5^2}$
$= 8.6$

$\text{arg} = \tan^{-1}\frac{5}{7}$
$= 0.62 \text{ rads} = \pi/5$

$\underline{8.6e^{i\frac{\pi}{5}}}$

b.) $\text{mod} = \sqrt{\frac{1}{2}^2 + \frac{-1}{3}^2}$
$= 0.61$

$\text{arg} = \tan^{-1}\frac{-\frac{1}{3}}{\frac{1}{2}}$
$= {}^{-}0.58 \text{ rads}$

$0.61e^{-0.58i}$

7.) $\dfrac{(\cos\theta + i\sin\theta)^8}{(\cos(2\theta) - i\sin(2\theta))}$

we know $\cos(-2\theta) = \cos(2\theta)$
$\sin(-2\theta) = -\sin(2\theta)$

$\dfrac{(\cos\theta + i\sin\theta)^8}{(\cos\theta + i\sin\theta)^{-2}} = \underline{(\cos\theta + i\sin\theta)^{10}}$

8.) a.) $z^3 = -1 + 0i$

$\text{mod} = \sqrt{-1^2 + 0^2}$ $\quad$ $\arg = \text{Tan}^{-1}\left(\frac{0}{-1}\right)$

$= 1$ $\quad$ $= 0$

$1(\cos 0 + i \sin 0) = z^3$

$z^1 = \sqrt[3]{1}\left(\cos\frac{0}{3} + i\sin\frac{0}{3}\right)$

$z^2 = \sqrt[3]{1}\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)$

$z^3 = \sqrt[3]{1}\left(\cos\frac{4\pi}{3} + i\sin\frac{4\pi}{3}\right)$

b.) $z^4 = 1 + i$

$\text{mod} = \sqrt{2}$ $\quad$ $\arg = \frac{\pi}{4}$

$\sqrt{2}\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right) = z^4$

$z^1 = \sqrt[8]{2}\left(\cos\left(\frac{\pi}{16}\right) + i\sin\left(\frac{\pi}{16}\right)\right)$

$z^2 = \sqrt[8]{2}\left(\cos\left(\frac{9\pi}{16}\right) + i\sin\left(\frac{9\pi}{16}\right)\right)$

$z^3 = \sqrt[8]{2}\left(\left(\cos\left(\frac{17\pi}{16}\right) + i\sin\left(\frac{17\pi}{16}\right)\right)\right)$

$z^4 \ \sqrt[8]{2}\left(\left(\cos\left(\frac{25\pi}{16}\right) + i\sin\left(\frac{25\pi}{16}\right)\right)\right)$

c.) $z^4 = {}^-25 + 0i$

$\text{mod} = \sqrt{25^2 + 0^2}$ $\qquad$ $\arg = \tan^{-1}\left(\frac{0}{25}\right)$

$= 25$ $\qquad$ $= 0$

$25(\cos 0 + i \sin 0) = z^4$

$z^1 = \sqrt[4]{25}\left(\cos\left(\frac{0}{4}\right) + i \sin\left(\frac{0}{4}\right)\right)$

$z^2 = \sqrt[4]{25}\left(\cos\left(\frac{\pi}{2}\right) + i \sin\left(\frac{\pi}{2}\right)\right)$

$z^3 = \sqrt[4]{25}\left(\cos \pi + i \sin \pi\right)$

$z^4 = \sqrt[4]{25}\left(\cos\left(\frac{3\pi}{2}\right) + i \sin\left(\frac{3\pi}{2}\right)\right)$

9.) $(2+2i)^{\frac{1}{3}}$

$\text{mod} = \sqrt{2^2 + 2^2}$ $\qquad$ $\arg = \tan^{-1}\left(\frac{2}{2}\right)$

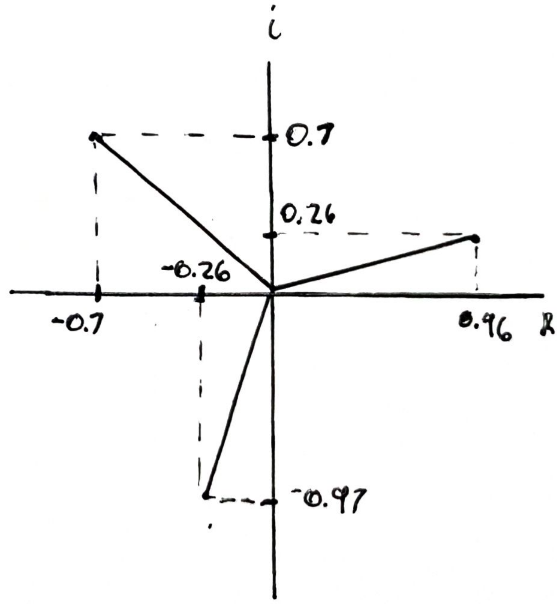
$= \sqrt{8}$ $\qquad$ $= \frac{\pi}{4}$

$8^{1/2}\left(\cos\left(\frac{\pi}{4}\right) + i \sin \frac{\pi}{4}\right)^{\frac{1}{3}}$

$8^{1/6}\left(\cos\left(\frac{\pi}{12}\right) + i \sin\left(\frac{\pi}{12}\right)\right)$

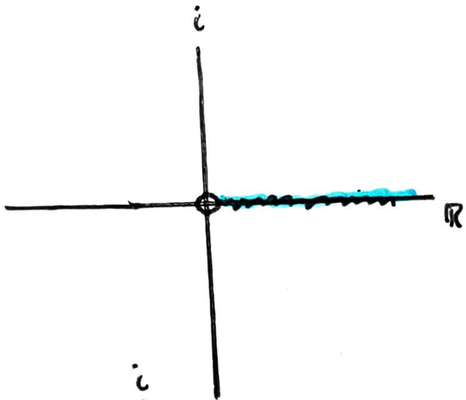
$8^{1/6}\left(\cos\left(\frac{9\pi}{12}\right) + i \sin\left(\frac{9\pi}{12}\right)\right)$

$8^{1/6}\left(\cos\left(\frac{9\pi}{12}\right) + i \sin\left(\frac{9\pi}{12}\right.\right.$



10.)

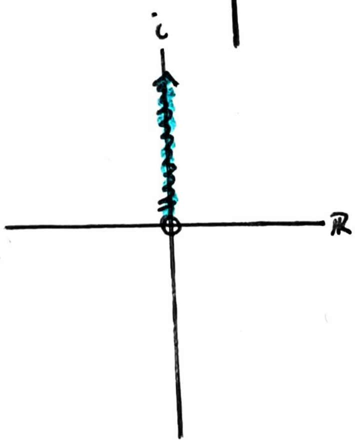
a.) $\arg(z) = 0$



z is any real number ≥ 0

$[0, \infty)$

b $\arg(z) = \frac{\pi}{2}$



any z where the $Re(z) = 0$ and $Im(z) > 0$