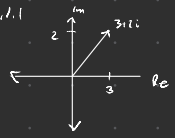
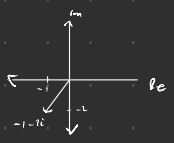
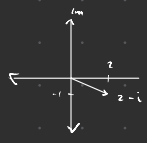
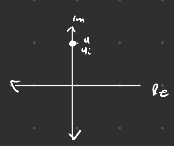
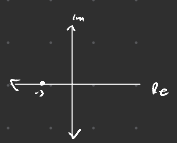
4.1.1

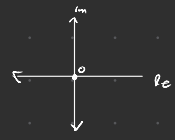




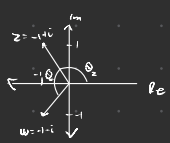








4.1.2 a)



b) $|z| = \sqrt{(-1)^2 + 1^2} = \sqrt{|+1|} = \sqrt{2}$

$|w| = \sqrt{1^2 + (-1)^2} = \sqrt{1+1} = \sqrt{2}$

c) $a = |z| \cdot \cos(\theta_z) \Rightarrow \theta_z = \arccos\left(\frac{a}{|z|}\right) = \arccos\left(\frac{-1}{\sqrt{2}}\right) = \frac{1}{4}\pi + \frac{\pi}{2} = \frac{3\pi}{4}$

$\theta_w = \arccos\left(\frac{a}{\sqrt{w}}\right) + \pi \Rightarrow \frac{1}{4}\pi + \pi = \frac{5\pi}{4}$

d) $z = |z|e^{i\theta} = \sqrt{2}e^{i\frac{3\pi}{4}}$

$w = |w|e^{i\theta} = \sqrt{2}e^{i\frac{5\pi}{4}}$

4.1.3

a) $z = 2e^{i\left(\frac{4\pi}{3}\right)}$

$a = 2 \cdot \cos\left(\frac{4\pi}{3}\right) = -1$

$b = 2 \cdot \sin\left(\frac{4\pi}{3}\right) = -\sqrt{3}$

b) $z = -1 - \sqrt{3}\,i$

4.1.4 $e^{i\frac{\pi}{4}} \Rightarrow a = 1 \cdot \cos\frac{\pi}{4} = \frac{\sqrt{2}}{2}$, $b = 1 \cdot \sin\frac{\pi}{4} = \frac{\sqrt{2}}{2} \rightarrow z = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i$

$e^{i\frac{\pi}{3}} \Rightarrow a = 1 \cdot \cos\frac{\pi}{3} = \frac{1}{2}$, $b = 1 \cdot \sin\frac{\pi}{3} = \frac{\sqrt{3}}{2} \rightarrow z = \frac{1}{2} + \frac{\sqrt{3}}{2}i$

$e^{i\frac{2\pi}{3}} \Rightarrow a = 1 \cdot \cos\frac{2\pi}{3} = -\frac{1}{2}$, $b = 1 \cdot \sin\frac{2\pi}{3} = \frac{\sqrt{3}}{2} \rightarrow z = -\frac{1}{2} + \frac{\sqrt{3}}{2}i$

$e^{i\pi} \Rightarrow a = 1 \cdot \cos\pi = -1$, $b = 1 \cdot \sin\pi = 0 \rightarrow -1$

$\frac{1}{2}e^{\frac{3\pi}{2}} \Rightarrow a = \frac{1}{2}\cos\frac{3\pi}{2} = 0$, $b = \frac{1}{2} \cdot \sin\frac{3\pi}{2} = -\frac{1}{2} = -\frac{1}{2}i$

$2e^{i\frac{\pi}{3}} \Rightarrow a = 2 \cdot \cos\frac{\pi}{3} = 1$, $b = 2 \cdot \sin\frac{\pi}{3} = \sqrt{3} = 1 + \sqrt{3}i$

4.1.5 $z = 2 + 4i$ $\quad w = 7 - 3i$

$z + w = 2 + 4i + 7 - 3i = 9 + i$

$z \cdot w = (2+4i)(7-3i) = 14 - 6i + 28i + 12 = 26 + 22i$

4.1.6 $2e^{-i\frac{\pi}{3}} = a = 2 \cdot \cos\left(-\frac{\pi}{3}\right) = 1$, $b = 2 \cdot \sin\left(-\frac{\pi}{3}\right) = -\sqrt{3} = 1 - \sqrt{3}i$

$5e^{i} \Rightarrow a = 5\cos(1) = 2{,}7$, $b = 5\sin(1) = 4{,}2 \Rightarrow 2{,}7 + 4{,}2i$

4.1.7

$-2-2i \Rightarrow |z| = \sqrt{(-2)^2+(-2)^2} = \sqrt{8} = 2\sqrt{2}$

$\theta = \arccos\left(\frac{-2}{2\sqrt{2}}\right) + \frac{\pi}{2} = \frac{5}{4}\pi \Rightarrow \sqrt{8}\, e^{i\frac{5\pi}{4}}$

$3+4i \Rightarrow |z| = \sqrt{3^2+4^2} = \sqrt{9+16} = 5$

$\theta = \arccos\left(\frac{3}{5}\right) = 0{,}927 \Rightarrow 5e^{i\,0{,}927}$

4.2.1 a) $(1+i)+(5-3i) = 6-2i$

b) $-1-i-2-3i = -3-4i$

c) $2+3i-1 = 1+3i$

d) $4i+4i+3 = 3+8i$

e) $(4+2i)(2+2i) = 8+8i+4i-4 = 4+12i$

f) $(-1+3i)(1-i) = -1+i+3i+3 = 2+4i$

g) $(1+i)(1-i) = 1-i+i+1 = 7$

h) $(-2+7i)(-1+3i) = 2-6i-7i-21 = -19-13i$

i) $\frac{3+4i}{2+4i} = \frac{3+4i}{2+4i}\cdot\frac{2-4i}{2-4i} = \frac{6-12i+8i+16}{4+16} = \frac{22-4i}{20} = \frac{11}{10} - \frac{1}{5}i$