HW Jan 28, Johannes Byle

2.46 (a) Real = 1, Imaginary = 1, Modulus = $\sqrt{2}$, Phase = $\frac{\pi}{4}$, $z^* = 1 - i$

(b) Real = 1, Imaginary = $-\sqrt{3}$, Modulus = 2, Phase = $-\frac{\pi}{3}$, $z^* = 1 + i\sqrt{3}$

(c) Real = 1, Imaginary = -1, Modulus = $\sqrt{2}$, Phase = $-\frac{\pi}{4}$, $z^* = 1 - i$

(d) Real = $5cos(\omega t)$, Imaginary = $5sin(\omega t)$, Modulus = 5, Phase = ωt, z^* = $5(cos(\omega t) - sin(\omega)t)$

2.47 (a) $\mathbf{z}+\mathbf{w} = 9 + 4i$, $\mathbf{z}$-$\mathbf{w} = 3 + 12i$, $\mathbf{zw} = 50$, $\mathbf{z}/\mathbf{w} = -\frac{14}{25} + \frac{48}{25}i$

(b) $\mathbf{z}+\mathbf{w} = 8cos\frac{\pi}{3} + 4cos\frac{\pi}{6} + i(8sin\frac{\pi}{3} + 4sin\frac{\pi}{6})$, $\mathbf{z}$-$\mathbf{w} = 8cos\frac{\pi}{3} + 4cos\frac{\pi}{6} - i(8sin\frac{\pi}{3} + 4sin\frac{\pi}{6})$, $\mathbf{zw} = 32e^{i\frac{\pi}{2}}$, $\mathbf{z}/\mathbf{w} = 2e^{i\frac{\pi}{6}}$

2.52 $\eta = ae^{i(\delta - \omega t)}$, thus $v_x = acos(\delta - \omega t)$ and $v_y = asin(\delta - \omega t)i$. This means that both v_x and v_y oscillate over time at a rate of ωt.
3.2 The other fragment would be traveling south with with horizontal velocity v_0 and straight downwards with vertical velocity v_0.