$\boxed{BQ}$ # 3b $\left(\sqrt{12i-5}\right)^2 = (a+bi)^2$

$$12i - 5 = a^2 + 2abi - b^2$$

$$-5 + 12i = (a^2 - b^2) + (2ab)i$$

$$\begin{cases} -5 = a^2 - b^2 \\ 12 = 2ab \end{cases} \longrightarrow b = \frac{12}{2a} = \frac{6}{a}$$

check

$$(2+3i)^2 = 4 + 12i \cancel{+9i^2}$$
-9

$$= 12i - 5$$

$$-5 = a^2 - \left(\frac{6}{a}\right)^2$$

$$-5 = a^2 - \frac{36}{a^2}$$

$$\boxed{\begin{matrix} 2+3i \\ \text{or} \\ -2-3i \end{matrix}}$$

$$-5a^2 = a^4 - 36$$

$$0 = a^4 + 5a^2 - 36$$

$$0 = (a^2 + 9)(a^2 - 4)$$

no real sol. $\quad a = 2$ or $a = -2$

$b = 3$ or $b = -3$

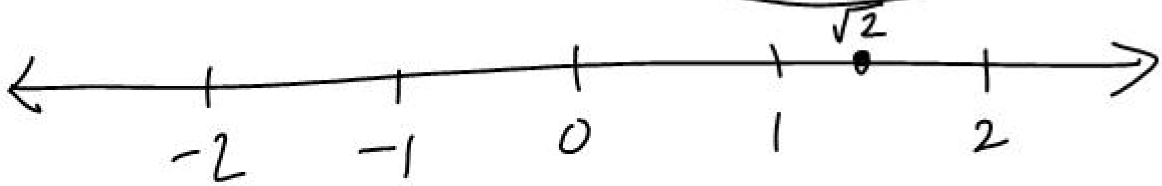
$\boxed{3F}$ **1c**

$$\frac{(2-i)\left(\frac{2i-1}{3}\right)}{\frac{1}{2}-\frac{5}{2}i}$$

$$= \frac{\frac{4}{3}i - \frac{2}{3} + \cancel{\frac{2}{3}i^2} + \frac{1}{3}i}{\frac{1}{2}-\frac{5}{2}i} = \frac{\left(0+\frac{5}{3}i\right)6}{\left(\frac{1}{2}-\frac{5}{2}i\right)6}$$

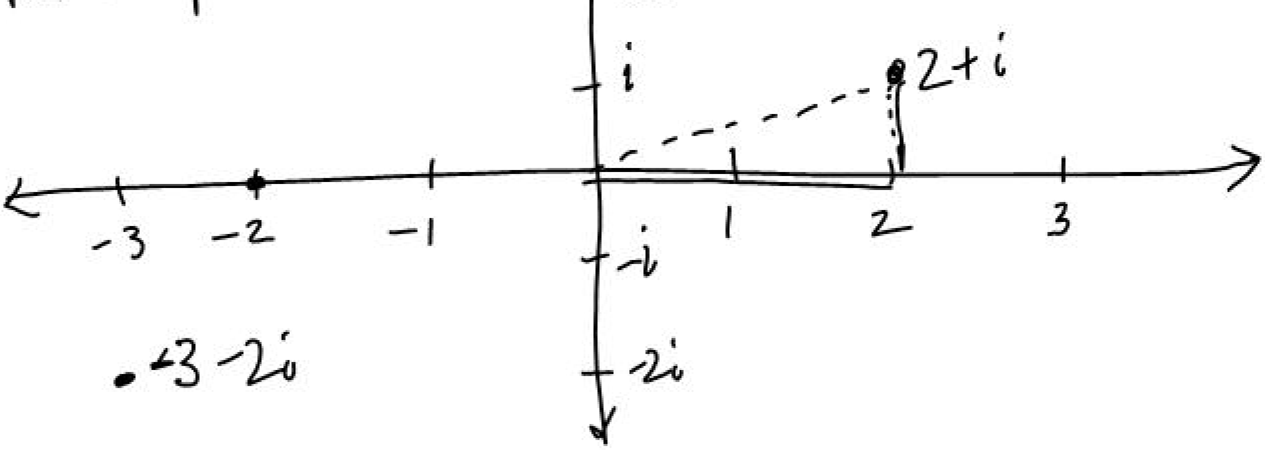
$$= \frac{10i}{3-15i}\cdot\frac{3+15i}{3+15i} = \frac{30i + 150\cancel{i^2}}{9+225\cancel{i^2}}$$

$$= \frac{-150}{234}+\frac{30}{234}i = \frac{-25}{39}+\frac{5}{39}i$$



The Complex Plane

$$|2+i| = \sqrt{2^2+1^2} = \sqrt{5}$$



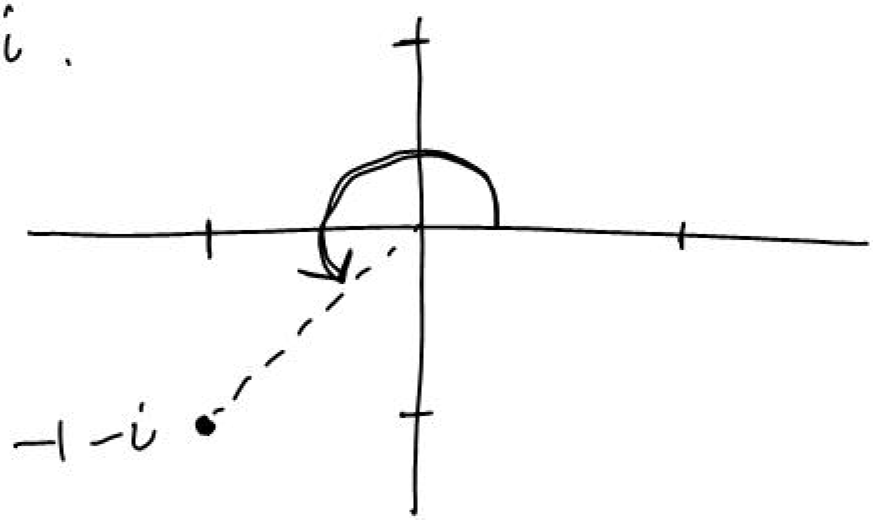
$r = \sqrt{a^2+b^2}$ is the <u>modulus</u> or absolute value of $a+bi$

θ is the <u>argument</u> of $a+bi$

Ex. Find the modulus and argument of $z = -1-i$.

$|-1-i| = \sqrt{2}$

$\theta = \frac{5\pi}{4}$



The <u>conjugate</u> of $z = a+bi$

is $z^* = a-bi$

Practice $(2+4i)^4$

$$(2)^4 + \overset{4\cdot 8\cdot 4}{\binom{4}{3}(2)^3(4i)} + \overset{6\cdot 4\cdot 16}{\binom{4}{2}(2)^2(4i)^2}$$

$$+ \overset{4\cdot 2\cdot 64}{\binom{4}{1}(2)(4i)^3} + (4i)^4$$

$$= 16 + 128i - 384 - 512i + 256$$

$$= \underline{\underline{112 - 384i}}$$

HW $\boxed{3A}$ #4a, d

$\boxed{3D}$ #2

$\boxed{3F}$ #1b

$\boxed{3G}$ #1, 3e