

$$\textcircled{a} \quad f) \quad \frac{(4-3i)^5 (1-i)^3}{(5\sqrt{3}+5i)^9} \quad (r \operatorname{cis} \theta)^n = r^n \operatorname{cis} n\theta$$

$$a=4 \quad b=-3 \quad (\text{Quad } 4)$$

$$\begin{aligned} r &= \sqrt{16+9} & \alpha &= \tan^{-1}\left(\frac{3}{4}\right) & \theta &= 360-36.9 & \boxed{5 \operatorname{cis} 323.1^\circ} \\ r &= \sqrt{25} & \alpha &= 36.9^\circ & \theta &= 323.1^\circ \\ r &= 5 \end{aligned}$$

$$a=1 \quad b=-1 \quad (\text{Quad } 4)$$

$$\begin{aligned} r &= \sqrt{1+1} & \alpha &= \tan^{-1}\left(\frac{1}{1}\right) & \theta &= 360-45 & \boxed{\sqrt{2} \operatorname{cis} 315^\circ} \\ r &= \sqrt{2} & \alpha &= 45^\circ & \theta &= 315^\circ \end{aligned}$$

$$a=5\sqrt{3} \quad b=5 \quad (\text{Quad } 1)$$

$$\begin{aligned} r &= \sqrt{(5\sqrt{3})^2 + (5)^2} & \alpha &= \tan^{-1}\left(\frac{5}{5\sqrt{3}}\right) & \theta &= 30^\circ & \boxed{10 \operatorname{cis} 30^\circ} \\ r &= \sqrt{75+25} & \alpha &= 30^\circ \\ r &= 10 \end{aligned}$$

$$\frac{(5 \operatorname{cis} 323.1^\circ)^5 (\sqrt{2} \operatorname{cis} 315^\circ)^3}{(10 \operatorname{cis} 30^\circ)^9}$$

$$\frac{[5^5 \operatorname{cis}(5 \cdot 323.1)] [\sqrt{2}^3 \operatorname{cis}(3 \cdot 315)]}{10^9 \operatorname{cis}(9 \cdot 30)}$$

$$\frac{(3125 \operatorname{cis} 1615.5^\circ) (2\sqrt{2} \operatorname{cis} 945^\circ)}{100 \operatorname{cis} 60^\circ}$$

$$\frac{6250\sqrt{2} \operatorname{cis} 2560.5^\circ}{100 \operatorname{cis} 60^\circ}$$

$$62.5\sqrt{2} \operatorname{cis} 2500.5^\circ$$

$$\boxed{62.5\sqrt{2} \operatorname{cis} 340.5^\circ}$$

$$\textcircled{1} \text{ b) } 2i^3 - i^{12} + 2i^{18} - (3i^3)^3$$

$$2(-i) - 1 + 2(-1) - 27i^9$$

$$-2i - 1 - 2 - 27(i)$$

$$\boxed{-3 - 29i}$$

Review #1

$$\begin{aligned} \textcircled{1} \text{ b) } & 2i^3 - i^{12} + 2i^{18} - (3i^3)^3 \\ & 2i^3 - i^{12} + 2i^{18} - 27i^9 \\ & 2(-i) - (1) + 2(i^6 \cdot i^3) - 27(i^8 \cdot i) \\ & -2i - 1 + 2(-1) - 27(i) \\ & -2i - 1 - 2 - 27i \end{aligned}$$

$$\boxed{-3 - 29i}$$

$$\textcircled{1} \text{ c) } \frac{(1+i)(2-i)}{(-3+2i)}$$

$$\frac{2+i-i^2}{(-3+2i)}$$

$$\frac{(3+i)(-3-2i)}{(-3+2i)(-3-2i)}$$

$$\frac{-9 - 9i - 2i^2}{9 - 4i^2}$$

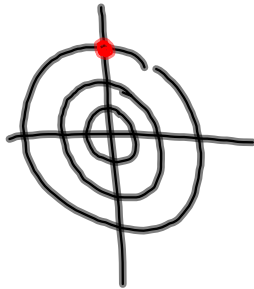
$$\frac{-7-9i}{13} \rightarrow \left(\frac{-7}{13} - \frac{9i}{13} \right)$$

$$\textcircled{4} \text{ b) } (-3, \frac{3\pi}{2})$$

$$\begin{aligned} r &= -3 \\ \theta &= \frac{3\pi}{2} \end{aligned} \cdot (-3, 270^\circ)$$

Convert to Degrees

$$\frac{3\pi}{2} \times \frac{180^\circ}{\pi} = 270^\circ$$



Review # 2

$$(r \text{cis} \theta)^n = r^n \text{cis} n\theta$$

① c) $(\underline{1+i})^{11} (\underline{1-i})^{15}$

① $r = \sqrt{1^2 + 1^2}$
 $r = \sqrt{2}$

② $\alpha = \tan^{-1}\left(\frac{1}{1}\right)$
 $\alpha = 45^\circ$

③ Quad 1
 $\theta = \alpha$
 $\theta = 45^\circ$

④ $\underline{\sqrt{2} \text{cis} 45^\circ}$

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

② $\alpha = \tan^{-1}\left(\frac{1}{-1}\right)$
 $\alpha = 45^\circ$

③ Quad 4
 $\theta = 360^\circ - 45^\circ$
 $\theta = 315^\circ$

④ $\underline{\sqrt{2} \text{cis} 315^\circ}$

$$(\sqrt{2} \text{cis} 45^\circ)^{11} (\sqrt{2} \text{cis} 315^\circ)^{15}$$

$$(\sqrt{2}^{11} \text{cis} (11 \cdot 45^\circ)) (\sqrt{2}^{15} \text{cis} (15 \cdot 315^\circ))$$

$$(32\sqrt{2} \text{cis} 495^\circ) (128\sqrt{2} \text{cis} 4725^\circ)$$

$$(4096(2) \text{cis} 5220^\circ)$$

$$\boxed{8192 \text{cis} 180^\circ} \text{ Polar}$$

$$\boxed{-8192 + 0i} \text{ Rectangular}$$

Polar \rightarrow Rectangular
 $r \text{cis} \theta$ $a+bi$

① $a = r \cos \theta$ ② $b = r \sin \theta$ ③ $a+bi$

$$\textcircled{a} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Review # 1

$$\textcircled{a} \textcircled{b} \quad x^2 + 2 = 2x$$
$$x^2 - 2x + 2 = 0$$

$$a = 1$$
$$b = -2$$
$$c = 2$$

$$\textcircled{1} \text{ b) } \underline{(1-i)}^{10} \quad \begin{matrix} a=1 \\ b=-1 \end{matrix} \quad (r \text{cis} \theta)^n = r^n \text{cis} n\theta$$

$$\textcircled{1} r = \sqrt{(1)^2 + (-1)^2} \quad \textcircled{2} \alpha = \tan^{-1}\left(\frac{-1}{1}\right) \quad \textcircled{3} \text{Quad 4} \quad \textcircled{4} \underline{\sqrt{2} \text{cis} 315}$$

$$r = \sqrt{2} \quad \alpha = 45^\circ \quad \theta = 360 - 45^\circ$$

$$\theta = 315$$

$$(\sqrt{2} \text{cis} 315)^{10}$$

$$\sqrt{2}^{10} \text{cis} (10 \cdot 315)$$

$$32 \text{cis} 3150$$

$$\boxed{32 \text{cis} 270^\circ} \text{ Polar}$$

$$\boxed{0 - 32i} \text{ Rectangular}$$

$$\textcircled{1} e) \frac{(1+i)^2 (1-i\sqrt{3})^3}{(5\sqrt{3}+5i)^2}$$

$\textcircled{1} r = \sqrt{0^2 + 1^2}$ $\textcircled{2} \alpha = \tan^{-1}\left(\frac{1}{1}\right)$ $\textcircled{3} \text{Quad 1}$ $\textcircled{4} \sqrt{2} \text{cis } 45^\circ$
 $r = \sqrt{2}$ $\alpha = 45^\circ$ $\theta = 45^\circ$
 $r = \sqrt{2}$

$\textcircled{1} r = \sqrt{1^2 + (-\sqrt{3})^2}$ $\textcircled{2} \alpha = \tan^{-1}\left(\frac{\sqrt{3}}{1}\right)$ $\textcircled{3} \text{Quad 4}$ $\textcircled{4} 2 \text{cis } 300^\circ$
 $r = \sqrt{4}$ $\alpha = 60^\circ$ $\theta = 360^\circ - 60^\circ$
 $r = 2$ $\theta = 300^\circ$

$\textcircled{1} r = \sqrt{(5\sqrt{3})^2 + 5^2}$ $\textcircled{2} \alpha = \tan^{-1}\left(\frac{5}{5\sqrt{3}}\right)$ $\textcircled{3} \text{Quad 1}$ $\textcircled{4} 10 \text{cis } 30^\circ$
 $r = \sqrt{75 + 25}$ $\alpha = 30^\circ$ $\theta = 30^\circ$
 $r = 10$

$$\frac{(\sqrt{2} \text{cis } 45^\circ)^2 (2 \text{cis } 300^\circ)^3}{(10 \text{cis } 30^\circ)^2}$$

$$\frac{[\sqrt{2}^2 \text{cis}(2 \cdot 45^\circ)] [2^3 \text{cis}(3 \cdot 300^\circ)]}{[10^2 \text{cis}(2 \cdot 30^\circ)]}$$

$$\frac{(2 \text{cis } 90^\circ)(8 \text{cis } 900^\circ)}{100 \text{cis } 60^\circ}$$

$$\frac{16 \text{cis } 990^\circ}{100 \text{cis } 60^\circ}$$

$$0.16 \text{cis } 930^\circ$$

$$\boxed{0.16 \text{cis } 210^\circ} \text{ Polar Form}$$