

$$\textcircled{1} \text{ a) } (3-2i)(3-2i) - (2-i-i^2)$$

$$= 9 - 12i + 4i^2 - 2 + i + 1$$

$$= 9 - 11i - 4 - 2 + 1$$

$$= \boxed{2 - 11i}$$

$$\text{b) } 2i^3 - i^{10} + 2i^{19} - (3i^3)^2$$

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

$$= -2i - 1 - 2 - 27i$$

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

$$\text{c) } \frac{(1+i)(2-i)}{(-3+2i)} = \frac{(3+i)(-3-2i)}{(-3+2i)(-3-2i)} = \frac{-9-9i-2i^2}{9-4i^2} = \boxed{\frac{-7-9i}{13}}$$

$$\textcircled{2} \text{ a) } x^2 + x + 3 = 0$$

$$b=1 \quad c=3 \quad x = \frac{-1 \pm \sqrt{1-4(1)(3)}}{2}$$

$$x = \frac{-1 \pm \sqrt{1-12}}{2}$$

$$x = \boxed{\frac{-1 \pm i\sqrt{11}}{2}}$$

$$\text{b) } x^2 - 2x + 2 = 0$$

$$a=1 \quad b=-2 \quad c=2 \quad x = \frac{2 \pm \sqrt{4-4(1)(2)}}{2}$$

$$= \frac{2 \pm \sqrt{-4}}{2}$$

$$= \boxed{1 \pm i}$$

$$\textcircled{3} \text{ a) } 4 + 11i$$

$$\text{b) } 4 - 11i + 4 + 11i = 8$$

$$\text{c) } 4 - 11i - 4 - 11i = -22i$$

④ On Graph

$$\textcircled{3} \text{ a) } (-10, -\sqrt{21}) \Rightarrow (r, \theta)$$

$$\textcircled{1} \quad r = \sqrt{100 + 21} \quad r = 11$$

$$\textcircled{2} \quad \alpha = \tan^{-1}\left(\frac{\sqrt{21}}{10}\right) \quad \alpha = 24.62^\circ$$

$$\text{b) } (3, -5)$$

quad 3

$$\theta = 180 + \alpha$$

$$\theta = 204.62^\circ$$

$$\textcircled{3} \quad \boxed{(11, 204.6^\circ)}$$

$$r = \sqrt{34 + 9}$$

$$\textcircled{2} \quad \alpha = \tan^{-1}\left(\frac{5}{3}\right)$$

$$\alpha = 59.04^\circ$$

$$\textcircled{3} \quad \boxed{(\sqrt{34}, 301^\circ)}$$

$$\theta = 360 - \alpha$$

$$= 360 - 59.04$$

$$= 300.96$$

$$\textcircled{b} \text{ a) } (3, -240^\circ)$$

$$r = 3$$

$$\theta = -240$$

$$a = r \cos \theta$$

$$= 3 \cos(-240)$$

$$= -1.5$$

$$b = r \sin \theta$$

$$= 3 \sin(-240)$$

$$= 2.6$$

$$\boxed{-1.5 + 2.6i}$$

$$\text{b) } (4, \frac{5\pi}{6})$$

$$r = -4$$

$$\theta = 150$$

$$\frac{5\pi}{6} \times \frac{180}{\pi} = 150^\circ$$

$$a = -4 \cos(150)$$

$$= 3.46$$

$$b = -4 \sin(150)$$

$$= -2$$

$$\boxed{3.46 - 2i}$$