

1.  $\vec{a} = 2 \times \begin{bmatrix} 3 \\ 1 \end{bmatrix} - \begin{bmatrix} 5 \\ 6 \end{bmatrix}$   
 $= \begin{bmatrix} 6 \\ 2 \end{bmatrix} - \begin{bmatrix} 5 \\ 6 \end{bmatrix}$   
 $= \begin{bmatrix} 1 \\ -4 \end{bmatrix}$
2.  $\vec{b} = 4 \times \begin{bmatrix} 1 \\ 0 \end{bmatrix} + 3 \times \begin{bmatrix} 0 \\ 1 \end{bmatrix}$   
 $= \begin{bmatrix} 4 \\ 0 \end{bmatrix} + \begin{bmatrix} 0 \\ 3 \end{bmatrix}$   
 $= \begin{bmatrix} 4 \\ 3 \end{bmatrix}$
3.  $\begin{bmatrix} -3 \\ 4 \end{bmatrix}$   
 $r = \sqrt{-3^2 + 4^2}$   
 $= \sqrt{9 + 16} = 5$   
 $\theta = \arctan\left(\frac{4}{-3}\right)$   
 $\theta = -0,93$
4.  $\begin{bmatrix} \frac{1}{\sqrt{3}} \\ \sqrt{\frac{2}{3}} \end{bmatrix}$   
 $r = \sqrt{\left(\frac{1}{\sqrt{3}}\right)^2 + \left(\sqrt{\frac{2}{3}}\right)^2} = 1$   
 $\theta = \arctan\left(\frac{\sqrt{\frac{2}{3}}}{\frac{1}{\sqrt{3}}}\right)$   
 $\theta = 0,96$
5.  $|\vec{a}| = \sqrt{-8^2 + -15^2}$   
 $= \sqrt{64 + 225}$   
 $= 17 \quad \theta = \arctan \frac{-8}{-15}$   
 $= 0,49$
6.  $(1 + 3i) + (4 + 4i)$   
 $= (1 + 4) + (3i + 4i)$   
 $= (5 + 7i)$
7.  $(2 - i) + (-2 + i)$   
 $= (2 - 2) + (-i + i)$   
 $= 0$
8.  $(i) + (3) = 3 + i$
9.  $(5 + 2i)(5 - 2i)$   
 $= 25 - 10i + 10i - 4$   
 $= 21$
10.  $(2 - 7i)(3 - 2i)$   
 $= 6 - 4i - 21i + 14i$   
 $= 6 - 25i + 14i$   
 $= -8 - 25i$

$$11. 1 + 4i = \overline{1 + 4i} = 1 - 4i$$

$$12. \overline{-4 - 2i} = -4 + 2i$$

$$13. \begin{aligned} 1 + i \\ |z| &= \sqrt{1 + 1} \\ &= \sqrt{2} \end{aligned}$$

$$14. \begin{aligned} 5 - 12i &= \sqrt{5^2 + -12^2} \\ &= \sqrt{25 + 144} \\ &= \sqrt{169} \\ &= 13 \end{aligned}$$

$$15. \begin{aligned} 5 - 12i \\ r &= \sqrt{2} \\ \theta &= \arctan(1) \\ &= \frac{\pi}{4} \end{aligned}$$

$$16. \begin{aligned} 1 - i \\ r &= \sqrt{2} \\ \theta &= \arctan(-1) \\ &= -\frac{\pi}{4} \\ \sqrt{2}e^{-i\frac{\pi}{4}} \end{aligned}$$

$$17. \begin{aligned} r &= \sqrt{25} = 5 \\ \theta &= \arctan\left(\frac{5}{0}\right) \\ &= \frac{\pi}{2} \\ &= 3e^{i\frac{\pi}{2}} \end{aligned}$$

$$18. e^{i\frac{\pi}{2}} = e^{-i\frac{\pi}{2}}$$

$$19. \begin{aligned} 4e^{i\pi} \\ y &= r \sin \theta \\ &= 4 \sin(\pi) \\ &= 0 \end{aligned}$$

$$\begin{aligned} x &= r \cos \theta \\ &= 4 \cos(\pi) \\ &= -4 \end{aligned}$$

$$\begin{aligned} 4(\cos(\pi) + i \sin(\pi)) \\ 4(-1 + i \times 0) \\ -4 \end{aligned}$$

$$\begin{aligned} |z| &= \sqrt{4^2 + 0^2} \\ &= 2 \end{aligned}$$

$$20. \begin{aligned} \beta &= 7e^{i\frac{\pi}{2}}e^{-i\frac{\pi}{3}} \\ &= 7(\cos(\frac{\pi}{2}) + i \sin(\frac{\pi}{2})) \times 1(\cos(\frac{\pi}{3}) - i \sin(\frac{\pi}{3})) \\ &= 7(1 + i0) \times 1(-\frac{1}{2} - i\frac{\sqrt{3}}{2}) \\ &= 7 \times (-\frac{\sqrt{4}}{2}i) \end{aligned}$$

$$= 7i$$

$$\begin{aligned} |z| &= \sqrt{7^2 + 0^2} \\ &= \sqrt{7^2} \\ &= 7 \end{aligned}$$

**note:**

$$\text{I } e^{i\frac{\pi}{2}} = -1$$

$$\begin{aligned} \text{II } &ke^{i\theta} \\ &\text{for: } k = \text{constant } \mathbb{R}, \theta = \text{rad} \end{aligned}$$

This document write using L<sup>A</sup>T<sub>E</sub>X author: Felix Montalfu(03082180055)