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. $\begin{bmatrix} \frac{1}{\sqrt{3}} \\ \sqrt{\frac{2}{3}} \end{bmatrix}$

   $r = \sqrt{\frac{1}{\sqrt{3}}^2 + \sqrt{\frac{2}{3}}^2} = 1$

   $\theta = \arctan\left(\frac{\sqrt{\frac{2}{3}}}{\frac{1}{\sqrt{3}}}\right)$

   $\theta = 0,96$

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. $1 + i$
$$|z| = \sqrt{1 + 1}$$
$$= \sqrt{2}$$

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

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

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

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

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

19. $\overline{5e^{-i\frac{\pi}{6}}} = 5e^{i\frac{\pi}{6}}$

20. $4e^{i\pi}$
$$y = r\sin\theta$$
$$= 4\sin(\pi)$$
$$= 0$$

$$x = r\cos\theta$$
$$= 4\cos(\pi)$$
$$= -4$$

$$4(\cos(\pi) + i\sin(\pi))$$
$$4(-1 + i \times 0)$$
$$-4$$

$$|z| = \sqrt{4^2 + 0^2}$$
$$= 2$$

21. $\beta = 7e^{i\frac{\pi}{2}}e^{-i\frac{\pi}{3}}$
$= 7(\cos\left(\frac{\pi}{2}\right) + i\sin\left(\frac{\pi}{2}\right)) \times 1(\cos\left(\frac{\pi}{3}\right) - i\sin\left(\frac{\pi}{3}\right))$
$= 7(1 + i0) \times 1(-\frac{1}{2} - i\frac{\sqrt{3}}{2})$
$= 7 \times (-\frac{\sqrt{4}}{2}i)$
$= 7i$

$|z| = \sqrt{7^2 + 0^2}$
$= \sqrt{7^2}$
$= 7$

note:

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

II $ke^{i\theta}$
for: $k = constant\,\mathbb{R}, \theta = rad$

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