Chapter 1 Complex Numbers
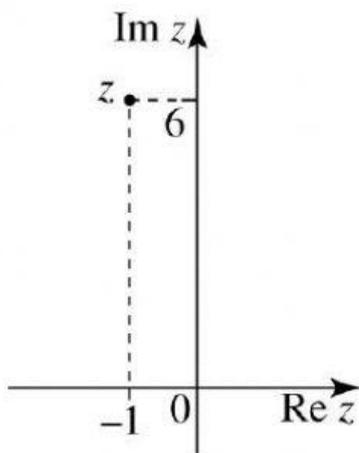
1.

The point z on the Argand diagram above is:

A $1-6i$

B $-1+6i$

C $-1-6i$

D $1+6i$

E $6-i$

2. If $z = i^5 + i^3 + i$ and $w = i^4 - i^2 - 2$, then $z + w$ is equal to:

A i

B $-2+i$

C $3i$

D $-2+3i$

E $-4+i$

3. If $z = 5 + 2i$, $w = -3 + i$ and $u = 4 - 3i$, then $2z + w - u$ is equal to:

A $9+6i$

B 6

C $-3-5i$

D $3+8i$

E $11+2i$

4. $(8-5i)(3+4i)$ is equal to:

A $14+17i$
B $54+32i$
C $14+15i$
D $14-15i$
E $44+17i$

5. If $z=-5+6i$ and $w=3-2i,$ then $\overline{zw}$ is equal to:

A $3+28i$
B $-27+28i$
C $-3-28i$
D $-27-28i$
E $3+8i$

6. $\dfrac{5i}{3+i}$ simplifies to:

A $\dfrac{5}{8}(1+3i)$

B $\dfrac{1}{10}(-5+15i)$

C $\dfrac{1}{2}(1+3i)$

D $\dfrac{1}{5}(2+5i)$

E $\dfrac{1}{2}(-1+3i)$

7. If $z=x+yi$ and $z=\sqrt{-5+12i},$ then the values of x and y respectively are:

A -3 and 2
B -2 and 3
C 3 and 2
D -3 and -2
E 2 and 3

8. If $z = 5 - 4i$ and $w = 2 + 3i$, then $\left|\dfrac{z}{w}\right|$ is equal to:

A $\quad \dfrac{13}{\sqrt{41}}$

B $\quad \dfrac{17}{6}$

C $\quad \dfrac{\sqrt{533}}{13}$

D $\quad 5\sqrt{2}$

E $\quad \dfrac{\sqrt{435}}{13}$

9. If $z = -7 - 7i$, then $\text{Arg } z$ is equal to:

A $\quad -\dfrac{3\pi}{4}$

B $\quad \dfrac{\pi}{4}$

C $\quad \dfrac{3\pi}{4}$

D $\quad -\dfrac{\pi}{4}$

E $\quad \dfrac{5\pi}{4}$

10. The Cartesian form of $\sqrt{2} \operatorname{cis} \dfrac{\pi}{3}$ is:

A $\quad 1 + i$

B $\quad \dfrac{1}{2}\left(\sqrt{2} + \sqrt{6}i\right)$

C $\quad 2 + 2i$

D $\quad \sqrt{2} + \sqrt{2}i$

E $\quad \dfrac{1}{2}\left(\sqrt{6} + \sqrt{2}i\right)$

11. If $z_1 = \sqrt{2}\ \text{cis}\left(-\dfrac{\pi}{6}\right)$ and $z_2 = \sqrt{6}\ \text{cis}\dfrac{2\pi}{3}$, then $z_1 z_2$ is equal to:

A $\quad 2\sqrt{3}\,\text{cis}\,\dfrac{\pi}{9}$

B $\quad 12\,\text{cis}\,\dfrac{\pi}{2}$

C $\quad 12\,\text{cis}\left(-\dfrac{\pi^2}{9}\right)$

D $\quad -2\sqrt{3}\,\text{cis}\left(-\dfrac{\pi}{2}\right)$

E $\quad 2\sqrt{3}\,\text{cis}\,\dfrac{\pi}{2}$

12. If $z = 1+i$ and $w = \sqrt{3} - i$, then $\dfrac{z^8}{w^4}$ is equal to:

A $\quad \dfrac{1}{\sqrt{2}}\left(-1+\sqrt{3}i\right)$

B $\quad 2\left(1-\sqrt{3}i\right)$

C $\quad \dfrac{1}{2}\left(-1+\sqrt{3}i\right)$

D $\quad \dfrac{1}{2}\left(-1-\sqrt{3}i\right)$

E $\quad \dfrac{1}{2}\left(-3+i\right)$

13. When factorised over C, $z^2 + 4z + 7$ is equal to:

A $\quad (z+3)(z+1)$

B $\quad (z+2+\sqrt{3}i)(z+2-\sqrt{3}i)$

C $\quad (z+2-\sqrt{3}i)(z-2+\sqrt{3}i)$

D $\quad (z+2+\sqrt{3}i)(z+2+i)$

E $\quad (z+2+\sqrt{7}i)(z+2-\sqrt{7}i)$
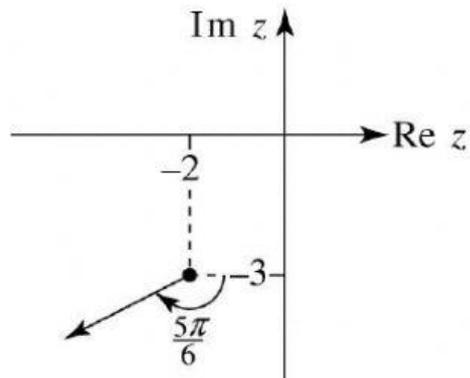
14. The solutions to $z = \sqrt{5+12i}$ are:

A $-3 + 2i, \ -3 - 2i$
B $2 - 3i, \ 2 + 3i$
C $-2 - 3i, \ -2 + 3i$
D $-3 - 2i, \ 3 + 2i$
E $\sqrt{13} + \sqrt{13}i$

15. The solutions to $z^4 = 81$ are:

A $-3, \ +3, \ -3i, \ 3i$
B $-3, \ 3$
C $-3 + 3i, \ 3 - 3i$
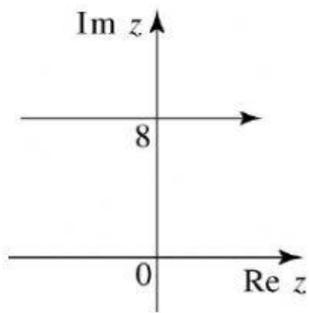D $-\sqrt{3}, \ \sqrt{3}, \ -\sqrt{3i}, \ \sqrt{3i}$
E $-3, \ 3, \ 3i$

16.

The graph above can be described by:

A $\left\{ z : \mathrm{Arg}(z - 2 - 3i) = \dfrac{5\pi}{6} \right\}$

B $\left\{ z : \mathrm{Arg}(z + 2 + 3i) = -\dfrac{5\pi}{6} \right\}$

C $\left\{ z : \mathrm{Arg}(z - 2 - 3i) = -\dfrac{5\pi}{6} \right\}$

D $\left\{ z : \mathrm{Arg}(z + 3 + 2i) = \dfrac{7\pi}{6} \right\}$

E $\left\{ z : \mathrm{Arg}(z + 2 + 3i) = \dfrac{5\pi}{6} \right\}$

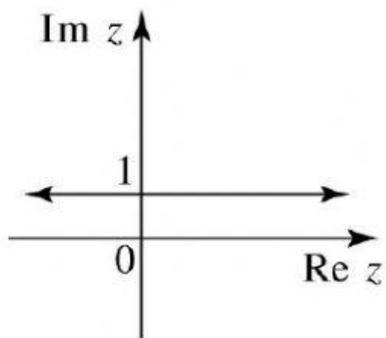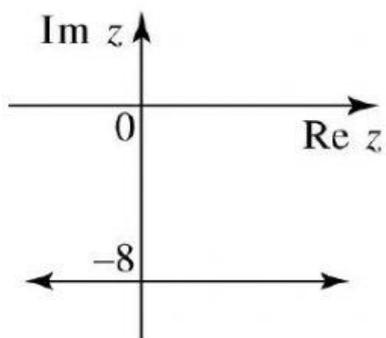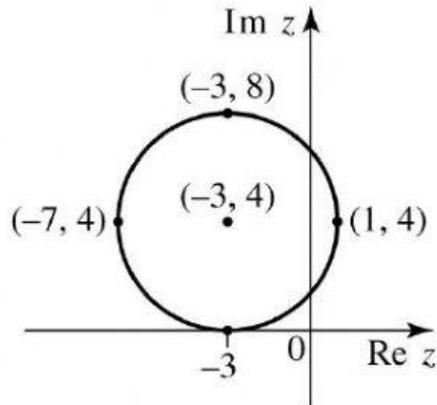17. Which one of the following graphs correctly represents $\{z : \text{Im}\,(z+2-5i)=3\}$?

A

B
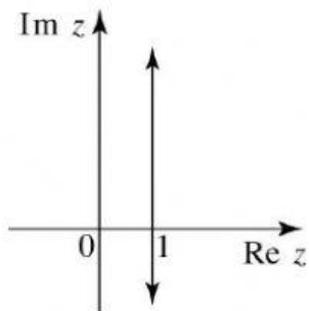
C
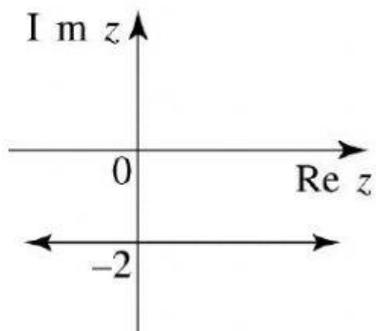
D

E

18. The equation for a circle of centre $4-i$ and radius 3 is:

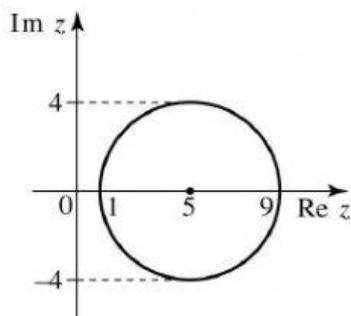A $|z+4-i|=3$

B $|z+4-i|=9$

C $|z-4+i|=3$

D $|z-4-i|=3$

E $|z-4+i|=9$

20.

19. The equation of the circle above is:

A $\{z:|z-3+4i|=4\}$

B $\{z:|z-3+4i|=16\}$

C $\{z:|z+3-4i|=2\}$

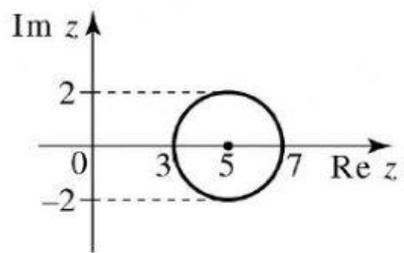D $\{z:|z+3-4i|=16\}$

E $\{z:|z+3-4i|=4\}$

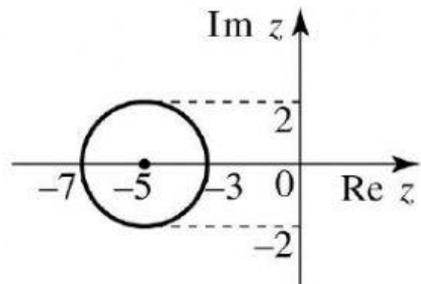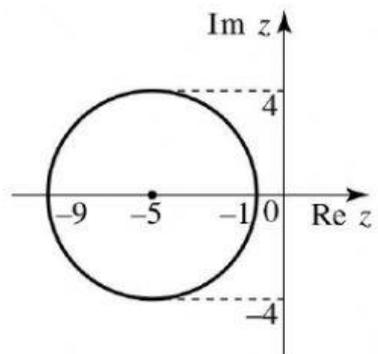20. The graph which correctly represents the circle described by $\{z:|z-5|=2\}$ is:

A

B

C

D

E