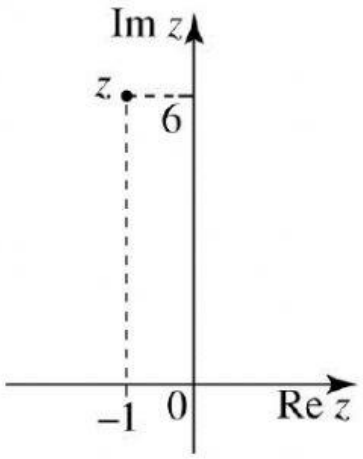
Chapter 1 Complex Numbers

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

A $\frac{5}{8}(1+3i)$
B $\frac{1}{10}(-5+15i)$
C $\frac{1}{2}(1+3i)$
D $\frac{1}{5}(2+5i)$
E $\frac{1}{2}(-1+3i)$

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 $\left|\frac{z}{w}\right|$ is equal to:

A $\frac{13}{\sqrt{41}}$

B $\frac{17}{6}$

C $\frac{\sqrt{533}}{13}$

D $5\sqrt{2}$

E $\frac{\sqrt{435}}{13}$

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

A $-\frac{3\pi}{4}$

B $\frac{\pi}{4}$

C $\frac{3\pi}{4}$

D $-\frac{\pi}{4}$

E $\frac{5\pi}{4}$

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

A $1+i$

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

C $2+2i$

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

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

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

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

B $12\ \text{cis}\ \frac{\pi}{2}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

E $(z+2+\sqrt{7i})(z+2-\sqrt{7i})$

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 $-3,\ +3,\ -3i,\ 3i$

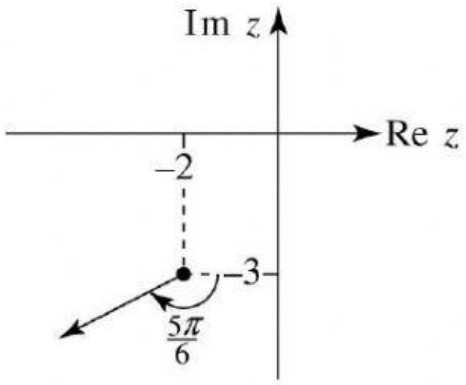
B $-3,\ 3$

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

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

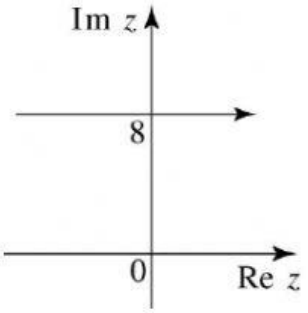
C $\left\{z : \text{Arg}(z-2-3i) = -\dfrac{5\pi}{6}\right\}$

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

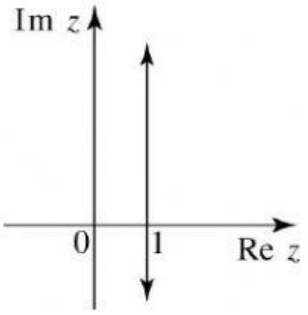
E $\left\{z : \text{Arg}(z+2+3i) = \dfrac{5\pi}{6}\right\}$

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

A



B



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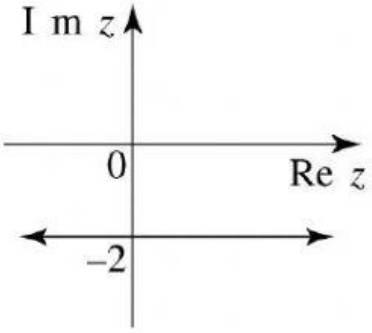
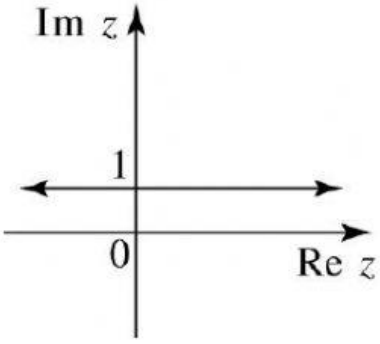
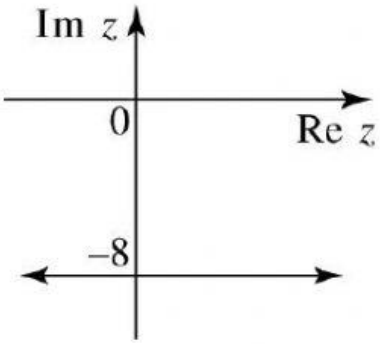


D



E



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

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

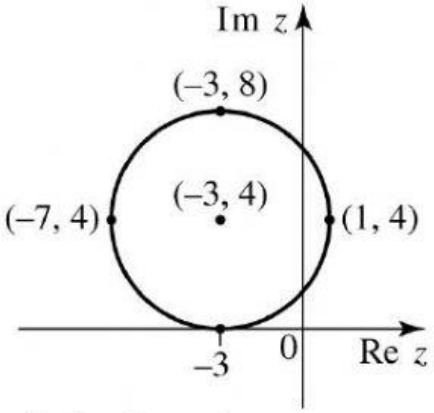
B $|z+4-i|=9$

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

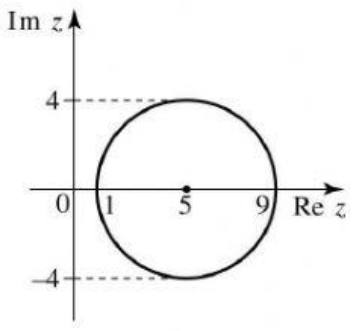
C $\{z:|z+3-4i|=2\}$

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

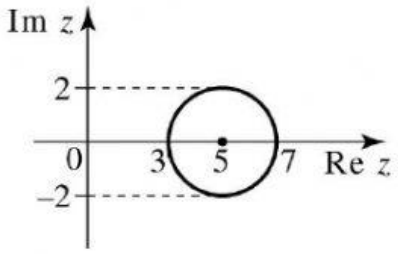
E $\{z:|z+3-4i|=4\}$

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

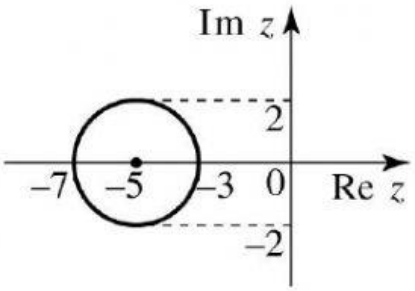
A



B



C



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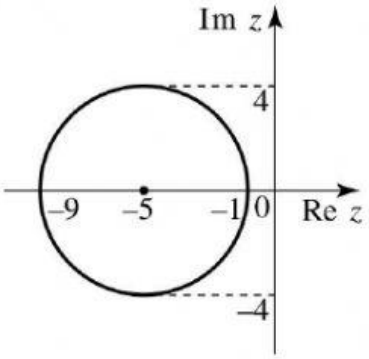
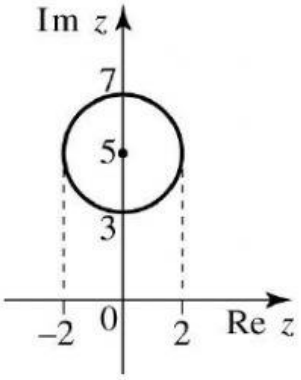
E