Complex Numbers Test 4A

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Name: _____

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Navigator | Assessment | Student | 30 min

Question: 1

If $(x-yi)^2 = -24i$ and $x, y \in R$ then x and y could be:

a) $x = 2\sqrt{3}$ & $y = -2\sqrt{3}$

b) $x = -2\sqrt{3}$ & $y = 2\sqrt{3}$

c) $x = 2\sqrt{3}$ & $y = 2\sqrt{3}$

d) $x = -3\sqrt{2}$ & $y = 3\sqrt{2}$

e) $x = 3\sqrt{2}$ & $y = -3\sqrt{2}$

Question: 2

If $z_1 = a + bi$ and $z_2 = c + di$ which one of the following relationships is true:

a) $\overline{z}_1 - \overline{z}_2 = \overline{z_1 - z_2}$

b) $\overline{z}_1 z_2 = z_1 \overline{z}_2$

c) $\sqrt{z_1^2} = |z_1|$

d) $\frac{1}{z_1} + \frac{1}{z_2} = \overline{z}_1 + \overline{z}_2$

e) $|z_1| + |z_2| = z_1\overline{z}_1 + z_2\overline{z}_2$

Question: 3

If $\left(3\sqrt{3}+3i\right)\left(4\sqrt{5}-4\sqrt{5}i\right) = rcis(\theta)$ then θ is equal to:

a) $\frac{5\pi}{12}$ b) $-\frac{5\pi}{12}$ c) $\frac{\pi}{12}$ d) $-\frac{\pi}{12}$ e) $\frac{\pi}{5}$

Question: 4

If $z = -a - ai$ where $a \in R^+$ then $\text{Arg}\left(z^5\right)$ is equal to:

a) $\left(-\frac{3\pi}{4}\right)^5$ b) $-\frac{5\pi}{4}$ c) $-\frac{15\pi}{4}$ d) $-\frac{\pi}{4}$ e) $\frac{\pi}{4}$

Question: 5

If $z = 3\text{cis}\left(\frac{\pi}{7}\right)$ then $\left(\overline{z}\right)^{-1}$ is equal to:

a) $\frac{1}{3}\text{cis}\left(\frac{\pi}{7}\right)$ b) $\frac{1}{3}\text{cis}\left(-\frac{\pi}{7}\right)$ c) $\frac{1}{3}\text{cis}\left(\frac{7}{\pi}\right)$ d) $-3\text{cis}\left(-\frac{7}{\pi}\right)$ e) $-3\text{cis}\left(\frac{7}{\pi}\right)$

Question: 6

Given $\sin(\theta) - i\cos(\theta) = cis\left(\theta - \frac{\pi}{2}\right)$ then $(\sin(\theta) - i\cos(\theta))^{12}$ could be written as:

a) $\text{cis}(12\theta)$ b) $-\text{cis}(12\theta)$ c) $\text{cis}(-12\theta)$ d) $\text{-cis}(-12\theta)$ e) None of these

Question: 7

If $P(z)=z^3+az^2+8z+6$, given $z+1-i$ and $z+c$ are factors where $a,c\in R$ then it follows:

a) $a=2$ and $c=0$

b) $a=5$ and $c=3$

c) $a=8$ and $c=6$

d) $a=4$ and $c=2$

e) $a=-8$ and $c=6$

Question: 8

If $P(z)$ is a polynomial in z of degree 5 with real coefficients, then which one of the following could be true?

a) $P(z)=0$ can have two real roots and three complex roots.

b) $P(z)=0$ can have three real roots and one pair of complex conjugates roots

c) $P(z)=0$ can have four real roots and one complex root.

d) $P(z)=0$ can have five complex roots.

e) $P(z)=0$ can have no real roots.

Question: 9

Which one of the following is **NOT** a solution to: $z^6-64=0$

a) $2\text{cis}\left(\frac{\pi}{3}\right)$ b) $2\text{cis}(\pi)$ c) $2\text{cis}\left(\frac{\pi}{6}\right)$ d) $1-\sqrt{3}i$ e) $-1+\sqrt{3}i$

Question: 10

The set of points in the complex plane defined by $|z-4|=|z+2i|$ corresponds to:

a) A circle with centre $4-2i$ and radius 1

b) A circle with centre $-4+2i$ and radius 1

c) A point given by $4-2i$

d) A point given by $-4+2i$

e) A straight line given by $\text{Im}(z)+2\,\text{Re}(z)=3$