# Complex Numbers Test 1A

Teachers Teaching with Technology™
Professional Development from Texas Instruments

Name: _____

7 8 9 10 11 **12**

Navigator | Assessment | Student | 25 min

**Question: 1**

Which of the following does **not** equal $-1$?

a) $i^6$

b) $\text{cis}(-\pi)$

c) $\text{cis}\left(-\frac{2\pi}{3}\right)+\text{cis}\left(\frac{2\pi}{3}\right)$

d) $\text{cis}\left(-\frac{\pi}{3}\right)+\text{cis}\left(\frac{\pi}{3}\right)$

e) $\text{cis}(\pi)$

**Question: 2**

The principal argument of $-\sqrt{2}\left(1+\sqrt{3}\right)+\sqrt{2}\left(1-\sqrt{3}\right)i$ is:

a) $\frac{\pi}{12}$ b) $\frac{11\pi}{12}$ c) $-\frac{11\pi}{12}$ d) 4 e) -4

**Question: 3**

If $z=\cos(\theta)+i\sin(\theta)$ and $z^3-pi=0$ where $|p|\le 1$, then the value of $\sin(3\theta)$ is equal to:

a) $p^3$ b) $\sqrt[3]{p}$ c) $p$ d) 0 e) $i$

**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 $(\overline{z})^{-1}$ 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**

Which of the following could **not** represent the complex number $-\sqrt{3}-i$

a) $-2\text{cis}\left(\frac{13\pi}{6}\right)$ b) $2\text{cis}\left(\frac{7\pi}{6}\right)$ c) $2\text{cis}\left(-\frac{5\pi}{6}\right)$ d) $-2\text{cis}\left(\frac{5\pi}{6}\right)$ e) $-2\text{cis}\left(\frac{\pi}{6}\right)$

**Question: 7**

If $P(z)=z^3+bz^2+cz-2a^3$ and $P(a-ai)=0$ where $a$, $b$ and $c$ are real numbers then

a) $b=-3a$ and $c=0$

b) $b=-3a$ and $c=4a^2$

c) $b=3a$ and $c=4a^2$

d) $b=-a$ and $c=0$

e) $b=a$ and $c=-4a^2$

**Question: 8**

If $z_1=a+bi$ and $z_2=a-bi$ where $a$ and $b$ are non-zero real numbers, which of the following statements is **false?**

a) $|z_1|=|z_2|$

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

c) $\text{Arg}(z_1)+\text{Arg}(z_2)=0$

d) $\text{Im}\left(z_1^2+z_2^2\right)=0$

e) $\text{Re}\left((z_1+z_2)^2\right)=0$

**Question: 9**

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: 10**

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

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

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

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

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

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