

Name: _____

Please show all work.

1. Simplify the following expressions:

$$(a) \frac{\sqrt{7}}{2 - \sqrt{7}} \quad (b) \sqrt[3]{\sqrt{5}} \sqrt[3]{25\sqrt{5}}$$

2. Find all complex solutions z to each given equation and sketch them in the complex plane:

$$(a) z^2 - iz + 1 = 0 \quad (b) z^3 - iz^2 + z = 0$$

3. Suppose $z = \sqrt{3} - i$.

(a) In the complex plane sketch z^n for $n = -1, 0, 1, 2, 3$.

(b) For $n = 21$ find real numbers r and θ , where $r \geq 0$ and $-\pi < \theta \leq \pi$, such that $z^n = re^{i\theta}$. What are the real and imaginary parts of z^n ?

4. Find all complex solutions z to each given equation and sketch them in the complex plane:

$$(a) z^4 + 16 = 0 \quad (b) z^3 + i = 0$$

5. In the complex plane sketch sets of all points z satisfying each given inequality:

$$(a) \operatorname{Re} z \leq \operatorname{Im} z \quad (b) |z + i| + |z - i| < 5$$

1	2	3	4	5	total (50)