

Name: \_\_\_\_\_

Please show all work.

1. Prove that  $\sqrt[3]{6}$  is irrational.
2. Express the complex number  $\frac{i}{1 - i\sqrt{3}}$  in standard form  $(a + ib)$  and in exponential form  $(re^{i\theta})$
3. Suppose  $z = 1 - i$ .
  - (a) In the complex plane sketch  $z^n$  for  $n = -1, 0, 1, 2, 3$ .
  - (b) Express  $z^{10}$  in exponential form and in standard form.
4. Find all complex solutions  $z$  to  $z^5 + 1 = 0$  and sketch them in the complex plane.
5. In the complex plane sketch sets of all points  $z$  satisfying each given inequality:
  - (a)  $|\operatorname{Im} z| < 1$
  - (b)  $|z + 1 + i| \geq \sqrt{2}$

| 1 | 2 | 3 | 4 | 5 | total (50) |
|---|---|---|---|---|------------|
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