

Math 222 Quiz 5

March 2, 2011

Your Name:

Your Section:

Instructions: You have 20 minutes to solve the following problems and the total score is 10 points. Below, i satisfies $i^2 = -1$.

1. Express $\frac{1+i\sqrt{3}}{1-i\sqrt{3}}$ as $re^{i\theta}$ where $r > 0$ and θ is real. Draw the Argand diagram. (4 pts)
2. Find the three complex cube roots of -1 . (3 pts)
3. Prove $\sin(2\theta) = 2 \sin \theta \cos \theta$, $\cos(2\theta) = \cos^2 \theta - \sin^2 \theta$ by De Moivre's Theorem. (3 pts)

Bonus1: True or false? If x is real, $-1 \leq \cos x \leq 1$. If x is complex, $-1 \leq \cos x \leq 1$ (2 pts).

Calculate $\cos(i)$ (1 pt)

Bonus2: Give an example that e^z can be negative if z is a complex number.(1 pt)

Prove e^z is never zero if z is complex.(Hint: Assume $z = a + bi$) (2 pts)