Math 130 Precalculus Spring 10 Sample midterm 3

(1) (10 points) Prove the following identity:

$$\frac{\cos^3 x - \sin^3 x}{\cos x - \sin x} = \frac{2 + \sin(2x)}{2}$$

(2) (15 points) Sketch one period of the graph $y = 40 \sin\left(\frac{1}{3}x - \frac{\pi}{12}\right)$. Label the lowest points, the highest points and the x-intercepts of the graph with their coordinates.

(3) (10 points) Solve the following triangle: $a = 3$cm, $b = 4$cm, $c = 6$cm.

(4) (10 points) Solve the following triangle: $a = 3$cm, $b = 4$cm, $C = 62°$.

(5) (10 points) Solve the following triangle: $a = 5$cm, $b = 5$cm, $A = 0.9$ radians.

(6) (10 points) Simplify $\sin(\arctan(x/2))$.

(7) (15 points) Find all solutions that are in $[0, 2\pi)$ of the equation

$$4 \sin^2 x - 3 = 0$$

(8) (15 points) Consider the complex number $z = 1 - \sqrt{3}i$.

(a) Write z in trigonometric form as $z = r(\cos(\phi) + i \sin(\phi))$.

(b) Compute z^2 in two ways: with z in the normal form and with z in trigonometric form. Show that both results are the same.

(c) Use de Moivre's Theorem to compute z^{10}. Write your result as a complex number in normal form.