



3. Find exact values for all solutions (both real and complex) to the equation  $x^2 + 5x = 3$ .

4. If  $\mathbf{v} = \langle -3, 4 \rangle$  is a vector, find

(a) The magnitude of  $\mathbf{v}$

(b) A unit vector in the direction of  $\mathbf{v}$ .

5. Convert the point with polar coordinates  $(10, 2\pi/3)$  to rectangular coordinates.

6. Jon's cat Nemo is planning to attack the neighbor's yappy little dog. Nemo will wait until the dog is three feet from the base of the wall beneath the porch window, then instantly shred the screen and pounce on the dog. If the window is five feet above ground level, and Nemo's trajectory once he jumps will essentially be a straight line because he's moving so fast, what angle will Nemo's path make with the vertical wall of the porch?

7. (a) Find the inverse of the function  $f(x) = 5(x+2)^3 - 1$ .
- (b) Explain clearly, as if to another student who's having trouble, what the inverse function and  $f(x)$  have to do with each other.

8. Verify the trig identity  $\frac{\sec \theta}{\cot \theta + \tan \theta} = \sin \theta$ .

9. Find all roots of the polynomial  $f(x) = x^3 + 2x^2 - 3x - 6$ .

10. If the temperature after  $t$  minutes of a cup of coffee is given by  $T(t) = 70 + 120e^{-0.06t}$ , how long will it be until the coffee has cooled to 120 degrees?

Extra Credit (5 points possible): A circle is drawn around an equilateral triangle with sides of length 1 so that the circle just touches each corner of the triangle. What is the area of the circle?