Final Exam Review

Math 112

Exercise 1:

a) Let $f(x) = x^2 + 6x + 9$. f is a transformation of the function $y = x^2$ — identify the transformation(s) and graph each step.

b) Apply a horizontal stretch by a factor of $\frac{1}{5}$ to f and graph the result.

Exercise 2:

a) Find $\sin(120°)$, $\cos(120°)$, and $\tan(120°)$ by drawing a picture and **using a reference angle**.

b) Find $\arcsin(-1)$, $\arccos(-1)$, and $\arctan(-1)$ in degrees. Draw a picture for each.

c) You lean a ladder up against a wall. The ladder makes an angle of 30° with the top of the wall, and the base of the ladder is 5 feet from the base of the wall. How long is the ladder, and how far does it reach up the wall?

Exercise 3:

a) What is the arc length of a 120° arc in a circle of radius 3?

b) Consider a triangle with one side of length 10, another of length 8, and an angle of $\frac{\pi}{3}$ between them. Find the third side of the triangle.

c) Find a sinusoidal function $f(x)$ with amplitude 4, midline 2, and period 1, such that the graph passes through the point $\left(\frac{1}{3}, 4\right)$ and is increasing there.

Exercise 4:

a) Find the unit vector decomposition of a vector with magnitude 7 and an angle of $\frac{5\pi}{4}$ from the horizontal.

b) Find the magnitude and direction of the vector $\vec{v} = -\sqrt{3}\vec{i} + 2\vec{j}$.

c) Find the dot product of the vectors in parts a) and b).

d) Find the angle between the vectors in parts a) and b).