Math 120B **Worksheet** **Name** _____

1. The air temperature above a frozen lake during the month of June is given by $L(t) = 20\sin(\frac{\pi}{12}t - \frac{5\pi}{6}) + 45$, where t represents hours elapsed since 12:00am June 1. The lake ice will begin to break up after 100 hours of 60° thaw time; you can only count time periods when the temperature is at least 60°. When will the ice break up?

2. Foxes and rabbits live in Nomandsland. The foxes prey on the rabbits. As the fox population increases, the rabbit population decreases, so the foxes get hungry and their population decreases as a result. Likewise, when the fox population is low, the rabbits multiply since they aren't being hunted as frequently.

Let $f(t)$ be the number of foxes at any given time. After careful observation, a population modeler noted that the fox population never got more than 8000 and that it never got less than 2000. He also noticed that the fox population reached its peak in April, and was at its lowest in June. Assume there is a sinusoidal function modeling the number of foxes at any given time t.

Make a clear graph of this model. Label several points on your graph and axes.

Give an equation for $f(t)$. Identify the amplitude, period, phase shift, and mean of your function.

What was the population during the month of May? At what other time(s) of the year is the population the same as in May?

3. Rodney Dangerfield was preparing to perform the triple lindy off the 10 foot diving board. He walked to the edge and jumped up and down several times. Model the height of his feet at any time t assuming the height of his feet varied sinusoidally with time. His feet travelled a total vertical distance of 4 feet. He started at the edge of the board, bounced down and then bounced up for a total of four times. At the max of the fifth cycle, he began the dive. This warm-up took 9.5 seconds. Give an equation modeling the height of his feet during this warm-up.

Instead of doing the triple lindy, he chickened out and did a cannonball instead. Assume he exhibited parabolic motion. The vertex of his arc was at the point(1,15). Give a quadratic model of his motion. Also, give the coordinates of where he hit the water.