1) The elk population in Denali National Park dropped from a high of 150,000 in 1950 to a low of 62,000 in 1975, and has risen since then. Scientists hypothesize that the population follows a sinusoidal cycle and that the elk population will again reach its previous high.

   a) Letting $t = 0$ in 1950, give a possible sinusoidal formula to describe the elk population as a function of time, in $t$ years since 1950.

   b) When does your model predict that the elk population will next reach 150,000 again?

   c) Find $P(10)$ and interpret your answer.

   d) During which year did the population first dip down to 100,000 elk.

2) Find formulas for the graphs shown in figures (a) and (b) below.

   a) ____________________________
      (as a Cosine)

   b) ____________________________
      (as a Sine)

   a) ____________________________
      (as a Sine)

   b) ____________________________
      (as a Cosine)
3) If the \( \cot X = \frac{-5}{12} \), and \( \csc X > 0 \), and \( \cos Y = \frac{-2}{3} \), and \( \csc Y < 0 \), then find the value of \( \cos (X - Y) \).

5) Solve each of the following equations, for \( 0 \leq \theta < 2\pi \). Express each of your answers exactly.

a) \( \frac{2}{\csc^2 \theta} = 1 - \cos \theta \)

b) \( 3\cos 2\theta = \cos \theta - 2 \)

3) For all values of \( x \) for which the expressions are defined, prove each of the following identities:

a) \( \sin 2\theta = \frac{2\tan \theta}{1 + \tan^2 \theta} \)