

Show all your work for full credit. Unsupported answers = reduced points. Please make clean, neat graphs. Show complete and quality work. Messy papers will not be graded.

1. Suppose  $\sin(t) = \frac{-\sqrt{2}}{3}$  and  $t$  is in quadrant IV. Find the value of the five other trigonometric functions.

[ \_\_\_\_\_ /3]

2. Make an accurate sketch of the function indicating the amplitude, period, and any shifts. Show at least 2 periods and mark both axes appropriately.

$$f(t) = 4 \cos(2t) - 1$$



[ \_\_\_\_\_ /3]

3. Make an accurate sketch of the function indicating the **amplitude**, **period**, and any **shifts**. Show at least 2 periods and mark both axes appropriately.

$$f(t) = 9 \sin\left(\frac{1}{3}t - \frac{\pi}{3}\right) + 13$$



[ \_\_\_\_\_ /3]

4. Make an accurate sketch of the function. Indicate any important features including asymptotes, period, etc. Show at least two full periods.

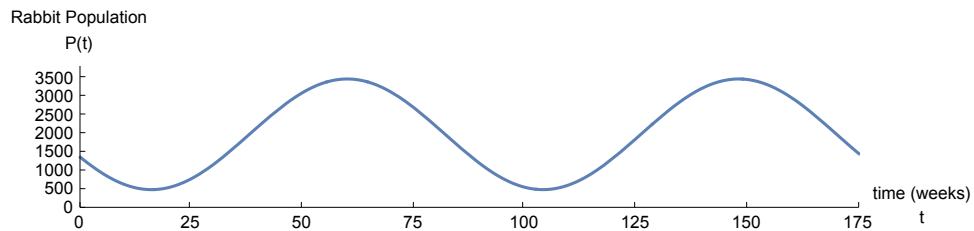
$$f(t) = 5 \sec\left(\frac{\pi}{4}t - \frac{3\pi}{4}\right)$$



[ /3]

5. A longitudinal study of the population of rabbits and lynx in a particular region was conducted and showed that the population of rabbits had a minimum population of 500 on week 16 of the study, and a maximum population of 3500 on week 60. The population is sinusoidal due to the birth and mortality of both the rabbits and lynx. A graph of the rabbit population for 175 weeks is given below.

- a) Find a sine function that models the population and  
b) Estimate the population 4 years after the start of the study (round to the nearest integer).



[ /3]