**Calculus   Worksheet #8   Unit 12   page 1** _____

Solve each of the following problems.  Show your complete solution neatly organized.

1.  A particle moving on a straight line is opposed by a frictional force which produces a negative acceleration that is proportional to the square of its velocity, v.   If v = 1 fps when t = 0, and v = 0.5 fps when t = 1, then find v when t = 9.

2.  Water is leaking from a large cylindrical tank (axis vertical) at a rate that is proportional to the square root of the depth of the water that is remaining in the tank.  If the depth drops from 36 feet to 25 feet in one hour, then how much longer will it take the tank to empty?

# Calculus    Worksheet #8   Unit 12   page 2

**Solve each of the following problems.  Show your complete solution neatly organized.**

**3.  The population of a city increases at a rate that is proportional to the current population. If the population was 100,000 in 1990 and 120,000 in 2000, then estimate the population in 2010.**

**4.  A hot object loses heat to its surroundings at a rate that is proportional to the temperature difference. (This is Newton's Law of Cooling.)  If a pan of hot water in a 70º room cools from 150º to 110º in 10 minutes, then express in terms of t the temperature of the water t minutes later.**