

1. PROJECT 4

Water from a pond is found to contain gasoline at a concentration of 0.03 parts per million. Inspection of the underground tank of a nearby service station reveals that the tank has a small rust hole in one spot. The tank is cylindrical in shape with a diameter of 10 feet and a length of 20 feet. The leak is located in the upper portion of the tank, at a distance of 8.1 feet from the bottom. From the size of the hole, it is estimated that 0.2 gallons will leak from the tank every hour that the level of gasoline in the tank is at the level of the hole or higher. Gasoline is delivered to the site every seven days, at which time the tank is completely filled. At the time of delivery, the tank is usually 10% full.

You are given the task of constructing a mathematical model to determine whether the leak could be the source of the gasoline in the pond.

Consider a two-compartment model with the first compartment being the groundwater and the second the pond.

You may assume the following:

- Gasoline diffuses from the groundwater into the pond at the rate of 12% every 24 hours.
- Gasoline diffuses from the pond into the groundwater at a rate of 4% every 24 hours.
- Gasoline evaporates from the pond at the rate of 15% every 24 hours
- The pond is roughly circular with a radius of 150 feet and an average depth of 3 feet.