

DIRECTIONS To receive full credit, you must provide complete legible solutions to the following problems in the space provided. Be sure to supply all the necessary steps that lead to your answers.

1. The population of a town grows at a rate proportional to the population present at time t . The initial population of 500 increases by 15% in 10 years. What will be the population in 60 years? How fast is the population growing at $t = 60$.

Ans _____

2. Initially 100 milligrams of a radioactive substance was present. After 8 hours the mass had decreased by 5%. If the rate of decay is proportional to the amount of the substance present at time t , determine the half-life of the radioactive substance.

Ans _____

3. A small metal bar, whose initial temperature was 20°C , is dropped into a large container of boiling water. How long will it take the bar to reach 90°C if it is known that its temperature increases 2° during the first second? (The boiling temperature for water is 100°C). How long will it take the bar to reach 97°C ?

Ans _____

4. A large tank is filled to capacity with 600 gallons of pure water. Brine containing 4 pounds of salt per gallon is pumped into the tank at a rate of 6 gal/min. The well-mixed solution is pumped out at the same rate. Find the number $A(t)$ of pounds of salt in the tank at time t .

Ans _____