Complete the following questions on a separate piece of paper. Show all work.
Do not use your notes unless absolutely necessary. If you use your notes please indicate where.
Questions will be gone over at tutoring sessions. Please be prepared.

Worksheet 3

Section 2.3

1. The time required for the solution y of the decay equation.

$$\begin{aligned} y' &= -ky \\ y(0) &= y_0 \end{aligned}$$

to be reduced from the initial value y_0 to one-half of y_0 is called the **half-life** t_h.

   (a) Find the half-life t_h in terms of the constant k.

   (b) Show that if the solution of the decay equation is some constant C and some time t_1, then the solution one half-life later will be $C/2$.

2. **The Annuity Equation** Solve the annuity problem

$$\begin{aligned} \frac{dS}{dt} &= rS + d \\ S(0) &= S_0. \end{aligned}$$

3. Suppose you deposit \$50 into an account monthly after graduating college and your grandparents give you \$2000 to start the account. If the annuity pays 6% interest (compounded continuously), what is the balance of the account 50 years later?

Hint: $\begin{cases} \dfrac{dS}{dt} = .06S + 600 \\ S(0) = 2000 \end{cases}$.