Your Name: **R. BUCKMIRE**   SCORE: /10

INSTRUCTIONS: Answer the following short-answer questions (in 10 minutes).
GOAL: This reading quiz is designed to illuminate your understanding of the concepts in the first few sections of the book: Euler's Method, Slope Fields, Modeling, Separation of Variables and Classifying Differential Equations.

1. (*2 points.*) An initial value problem consists of two parts. What are they?

An IVP consists of an initial condition $y(x_0)$ and an ODE $y' = f(x,y)$.

2. (*2 points.*) If a differential equation is separable, can you always get a solution? Explain.

You may not always get an EXPLICIT SOLUTION,
$$\frac{dy}{dx} = f(y)g(x) \Rightarrow \int \frac{dy}{f(y)} = \int g(x)dx,$$ technically one could think of this as an IMPLICIT solution even if the integrals are not able to be evaluated.

3. (*2 points.*) What is Euler's Method used for? Explain.

Euler's Method is used to approximate values of an IVP's solution $y(x)$ at other points, assuming constant slopes for durations of length Δx

4. (*2 points.*) Write down an example of an autonomous, 3rd order, nonlinear ordinary differential equation.

$$y''' + e^y = 0$$

3rd order ← nonlinear

only y variable appears ⟺ autonomous

5. (*2 points.*) Suppose the amount of money in your bank account after t months is given by $M(t)$ dollars and a deposit of $100 is made monthly and the money in the account bears interest at 5% per year. Write down a differential equation representing the rate of change of the money in your account with respect to time. (Indicate the units of the quantities you use!)

$$\frac{dM}{dt} = 1200 + 0.05M \quad \text{(yearly)} \qquad \text{or} \qquad \frac{dM}{dt} = 100 + \frac{5}{1200}M \quad \text{(monthly)}$$

BONUS (*2 points.*) What questions do you have about this section of the reading? Are there any topics you have seen that you would like to have addressed in class?