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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 $y(x)$

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

$y''' + e^y = 0$
3rd order \uparrow nonlinear \uparrow only y variable appears \Leftrightarrow 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!)

$$\frac{dM}{dt} = 1200 + 0.05M \quad \text{or} \quad \frac{dM}{dt} = 100 + \frac{5}{1200}M$$

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?