

**MA205 Section 36: Extra/Bonus/Surprise Quiz (Drop lowest quiz grade)**

Name: Solutions

Section 36

**Authorized references:** Calculator, reference sheet and your own brain.

**Time:** 15 minutes

1. In general, why do we model using differential equations? (Limit to 1 concise sentence.)

When we don't know the function that describes an observable thing but we do know the relationships between that thing and its derivative(s).

2. What is meant by the term "solution" to a differential equation? (Limit to 1 concise sentence.)

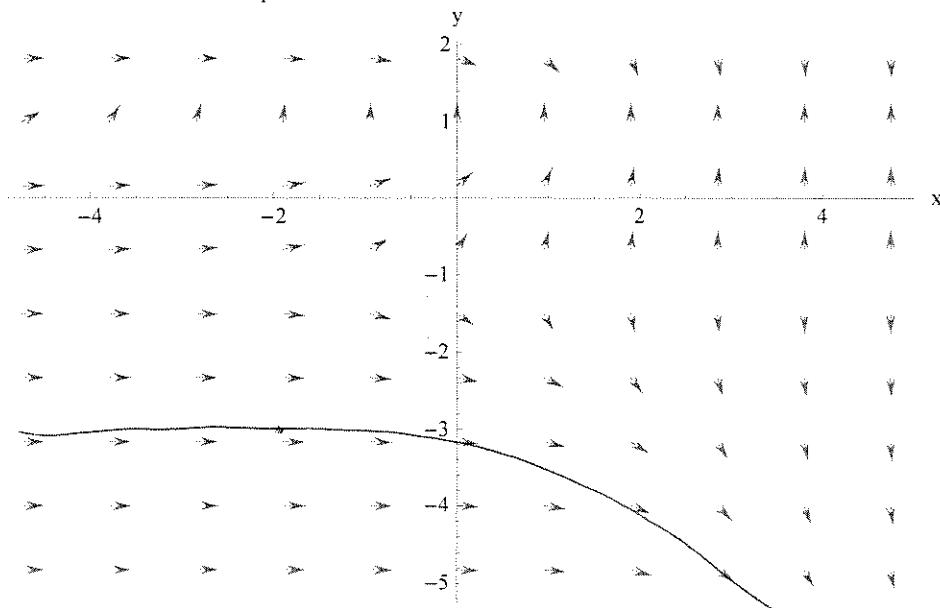
The equation or graphical representation of the unknown function.

3. Classify the following differential equation:

$$3y'' - y(y') = e^t$$

	Independent Variable:	$t$
	Dependent Variable:	$y$
<i>For the why just identify the term that gives it away.</i>	Order: Why?	$2^{\text{nd}}$ ( $y^n$ )
	Linearity: Why?	nonlinear ( $y'$ )
	Homogeneity: Why?	nonhomogeneous ( $e^t$ )

4. Below is a slope field for the differential equation  $y' = y^2(y') + e^x$ . Sketch the solution curve that passes through the point  $(-2, -3)$  over the entire domain pictured.



5. Given  $\frac{dr}{dt} = -.2r + t^2$  and  $r(1) = 2$ , what is the slope of the line tangent to the solution curve at the point  $(1, 2)$ ?

$$\text{slope} = -.2(2) + 1^2 = -.4 + 1 = 0.6$$