Name:_____
M243: Calculus II (Spring 2018)
Instructor: Justin Ryan
Unit III Exam: In Class Portion

WICHITA STATE UNIVERSITY

Read and follow all instructions. You may not use any notes or electronic devices. All you need is a pencil and your brain!

Part I: True/False [2 points each]
*Neatly write **T** if the statement is always true, and **F** otherwise.*

_____**1.** All solutions of the differential equation $y' = -1 - y^4$ are decreasing functions.

_____**2.** The equation $y' = t + y$ is separable.

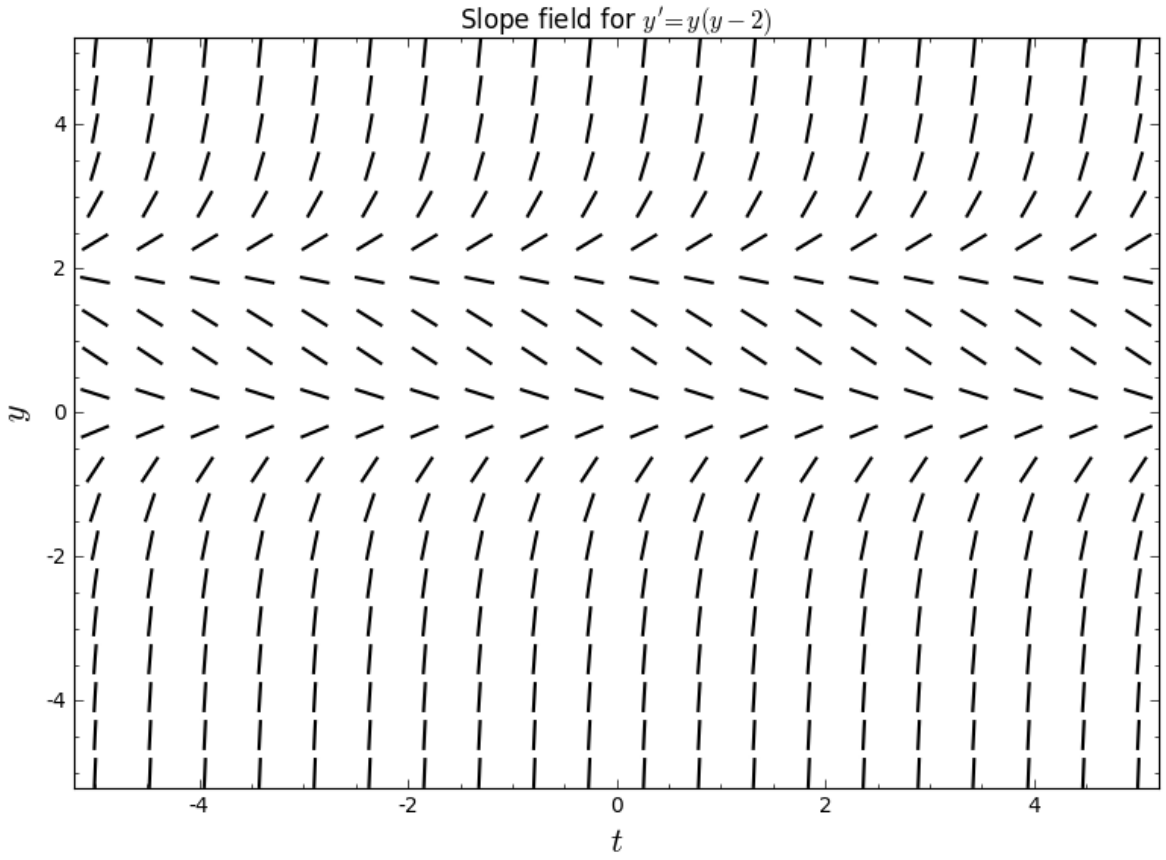
_____**3.** The equation $e^t y' = y$ is linear.

_____**4.** The equation $e^t y' = y$ is separable.

_____**5.** The equation $y' + ty = e^y$ is linear.

Part II: Computational Problems [10 points each]
Complete all 5 problems in the space provided. Show enough work, and write your work in a clear, organized fashion.

6. Consider the slope field for the differential equation $y' = y(y-2)$. Identify and sketch the equilibrium solutions, and then sketch 3 non-equilibrium solution curves with distinctly different behavior.



7, 8. Consider the curve given by the function $f(x) = \ln(\cos x)$ on the interval $-\frac{\pi}{2} < x < \frac{\pi}{2}$.

7. Set up the integral representing the arc length of the curve $y = f(x)$ on the interval $\left[0, \frac{\pi}{4}\right]$. Do **NOT** evaluate the integral.

8. Set up the integral representing the surface area of the surface obtained by rotating the graph of $y = f(x)$ about the y-axis over the interval $0 \leq x \leq \frac{\pi}{4}$. Do **NOT** evaluate the integral.

9. Find the general solution of differential equation. Be sure to solve for y as a function of t.

$$y' = 3(1 + y^2)$$

10. Consider the integral equation

$$y(t) = 9 + \int_0^t 2x\sqrt{y}\,dx.$$

Set up the corresponding initial value problem and find its solution.