

PRACTICE MIDTERM I, FOR MAT 127

- (1) For what values of k is the function e^{kx} a solution to the differential equation

$$y^{(2)} - 4y' + 3y = 0 \quad .$$

- (2) Consider the differential equation $y' = x^2 + xy$.

- (a) Find the slope of the direction field for given differential equation at the point $(2, 3)$ in the (x, y) -plane.
(b) Let y_c denote the solution to the given differential equation whose graph contains the point $(2, -1)$ in the (x, y) -plane. Find the value of the derivative of y_c at $x = 2$.

- (3) Let y_2 denote the solution to the initial value problem

$$y' = x^2 + y^2, \quad y(0) = 2 \quad .$$

Use Euler's method, with step size equal to 1, to estimate the value $y_2(3) = ?$.

- (4) Indicate which of the following differential equations are separable; and find all solutions for each separable equation.

- (a) $y' = x + y$.
(b) $y' = \sqrt{x^3y}$.
(c) $y' = e^xy$.
(d) $y' = \sin(xy)$.
(e) $y^{(3)} = xy$.

- (5) problem 36 on page 529.

- (6) problem 8 on page 538.