

Name: _____

ID Number: _____

Instructions: Clearly answer each of the questions below. Remember to check the back side. Use full sentences and proper grammar for verbal answers. Show your work and any formulas you employ. Simplify all answers as far as possible. Box your answers.

1. (2 pts) Select the letter of the correct slope field for each first order ordinary differential equation.

(a) _____ $y' = y$

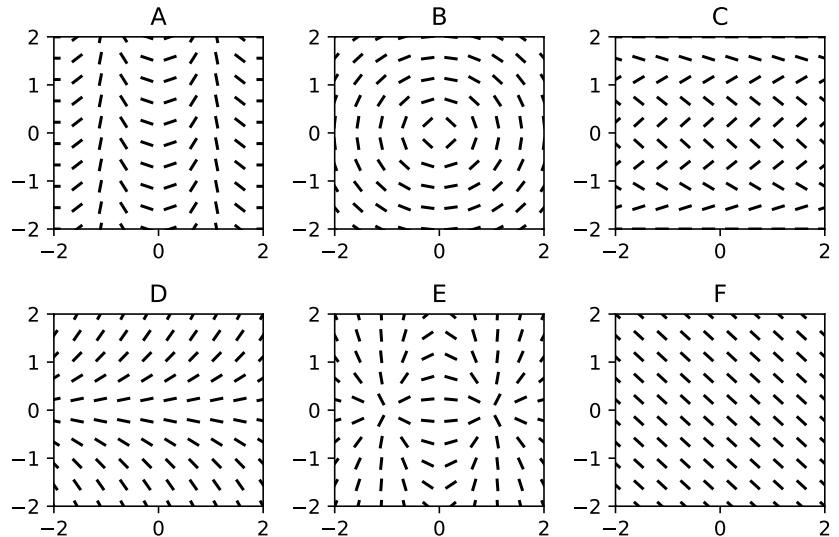
(b) _____ $y' = (2ty)/(t^2 - 1)$

(c) _____ $y' = \tan(\pi t/2)$

(d) _____ $y' = -t/y$

(e) _____ $y' = -1$

(f) _____ $y' = \sin(2\pi y)$



Answer: a. D, b. E, c. A, d. B, e. F, f. C

2. (2 pts) Slope fields _____ are autonomous, while slope fields _____ are integrable (independent of y).

Answer: C,D,F are autonomous, while A and F are integrable

3. (2 pts) Consider the differential equation

$$\sqrt{\psi + ke^m + \frac{d^3\psi}{dm^3}} = \left(\frac{d\psi}{dm}\right)^5 \sin(m) - \pi.$$

- (a) This equation is _____ differential equation (ordinary or partial)? **Answer: Ordinary**
- (b) It is a _____ order equation. **Answer: 3rd order**
- (c) The independent variable is _____. **Answer: m**
- (d) The dependent variable is _____. **Answer: ψ**
- (e) Is the equation autonomous? _____. **Answer: no, it is non-autonomous**

4. (2 pts) Circle each that is a solution of the equation $y' = y^2$.

a. 0 b. 1 c. $2x$

d. $\frac{1}{2-x}$ e. $\frac{-1}{x}$ f. e^x

Answer: a,d,and e are solutions

5. (2 pts) Find the general form of solutions to the equation $y' = 3 + 2y$.

Answer: The equation is separable, just like our falling-body equation.

$$\int \frac{dy}{3 + 2y} = \int dt,$$

$$\frac{1}{2} \ln |y + 3/2| = t + C,$$

$$y(t) = Ce^{2t} - \frac{3}{2}$$