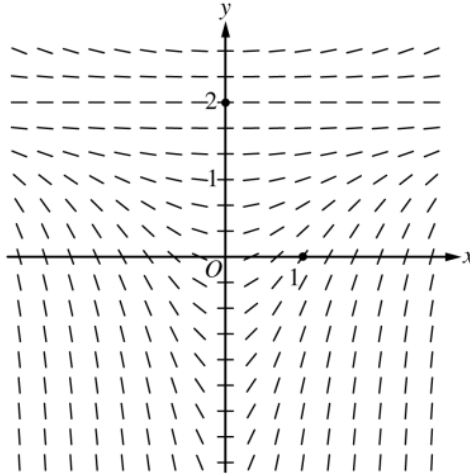


Unit 7 Differential Equations and Slope Fields Quiz Review WS 2

1) Consider the differential equation $\frac{dy}{dx} = \frac{1}{3}x(y-2)^2$.

- (a) A slope field for the given differential equation is shown below. Sketch the solution curve that passes through the point $(0, 2)$, and sketch the solution curve that passes through the point $(1, 0)$.



- (b) Let $y = f(x)$ be the particular solution to the given differential equation with initial condition $f(1) = 0$. Write an equation for the line tangent to the graph of $y = f(x)$ at $x = 1$. Use your equation to approximate $f(0.7)$.
- (c) Find the particular solution $y = f(x)$ to the given differential equation with initial condition $f(1) = 0$.

2)

A petri dish contains 100 bacteria, and the number N of bacteria is increasing according to the equation $\frac{dN}{dt} = kN$, where k is a constant and t is measured in hours. At time $t = 3$, there are 181 bacteria. Based on this information, what is the doubling time for the bacteria?

3)

The rate at which a baby bird gains weight is proportional to the difference between its adult weight and its current weight. At time $t = 0$, when the bird is first weighed, its weight is 20 grams. If $B(t)$ is the weight of the bird, in grams, at time t days after it is first weighed, then

$$\frac{dB}{dt} = \frac{1}{5}(100 - B).$$

Let $y = B(t)$ be the solution to the differential equation above with initial condition $B(0) = 20$.

Use separation of variables to find $y = B(t)$, the particular solution to the differential equation with initial condition $B(0) = 20$.

4)

For what value of k , if any, is $y = e^{-2x} + ke^{5x}$ a solution to the differential equation $2y' + y'' = 15e^{5x}$?

5)

Given the differential equation, $ww' = t^2 \sec^2(2t^3)$, find the particular solution, $w = f(t)$, with the initial condition $w(0) = -4$.

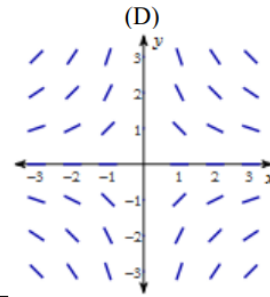
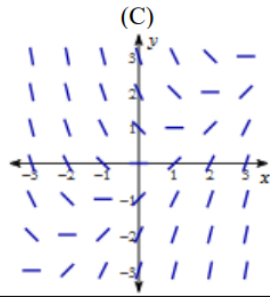
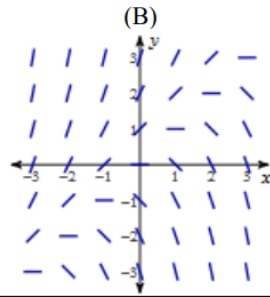
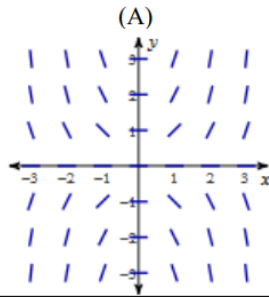
6)

Given the differential equation, $y'x \ln x - y = 0$, find the particular solution, $y = f(x)$, with the initial condition $f(e) = e$.

7) Slope Fields Practice:

Match the slope field with the differential equation.

1. $\frac{dy}{dx} = x - y$



2.

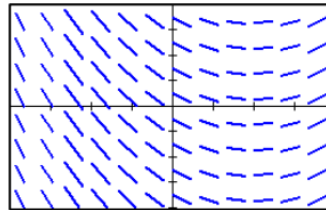
(A) $\frac{dy}{dx} = (x - 2)^2$

(D) $\frac{dy}{dx} = x + y$

(B) $\frac{dy}{dx} = 0.5x - 1$

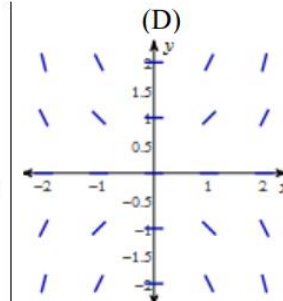
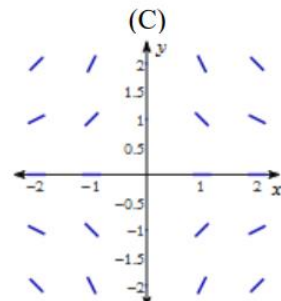
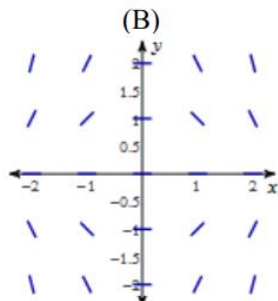
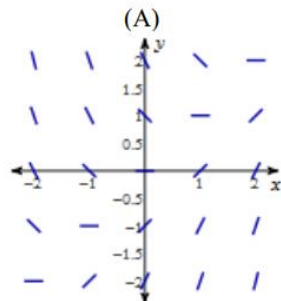
(E) $\frac{dy}{dx} = 0.5y$

(C) $\frac{dy}{dx} = x - y$



Match the slope field with the differential equation.

1. $\frac{dy}{dx} = xy$



2.

(A) $\frac{dy}{dx} = x - y$

(D) $\frac{dy}{dx} = y - x$

(B) $\frac{dy}{dx} = x + y$

(E) $\frac{dy}{dx} = xy^2$

(C) $\frac{dy}{dx} = (x - 1)(y - 1)$

