AP Calculus AB
Friday, April 12, 2013

Present two multiple choice review problems
Slope Fields
MMM #44

Finish the Diagnostic by Saturday/Sunday at midnight please. If you see that this is not possible, please email me and let me know. Thank you.

5. Find all intervals on which the graph of $f(x) = \dfrac{x-1}{x+3}$ is concave upward.

$$f'(x) = \frac{(x+3) - (x-1)}{(x+3)^2}$$

$$f'(x) = 4(x+3)^{-2}$$

$$f''(x) = -8(x+3)^{-3} \frac{-8}{(x+3)^3}$$

(B)

$$0 = -8(x+3)^{-3}$$

$$x = -3$$

$$(-\infty, -3)$$

6. Find $\dfrac{dy}{dx}$ for $5x^2 - 2xy + 7y^2 = 0$

$$10x - 2\left(x\frac{dy}{dx} + y\right) + 14y\frac{dy}{dx} = 0$$

$$10x - 2x\frac{dy}{dx} - 2y + 14y\frac{dy}{dx} = 0$$

$$10x - 2y = 2x\frac{dy}{dx} - 14y\frac{dy}{dx}$$

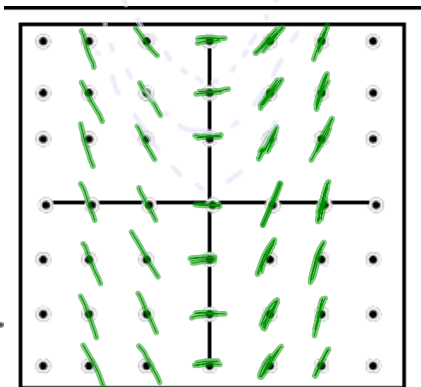$$10x - 2y = \frac{dy}{dx}(2x - 14y)$$

$$\frac{dy}{dx} = \frac{5x - y}{x - 7y} = \frac{y - 5x}{7y - x} \quad \text{(B)}$$

$$\frac{dy}{dx} = 2x$$
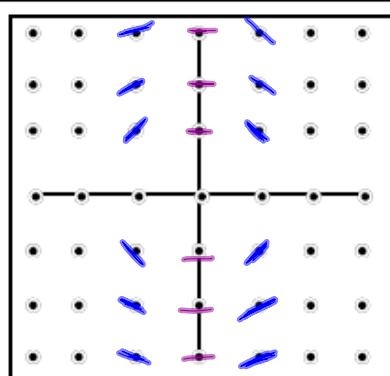
$$\int dy = \int 2x\,dx$$

$$y = x^2 + C$$

Point	Slope
$(0,0)$	0
$(0,1)$	0
$(0,2)$	0
$(1,0)$	

Find the solution going throu

③ $$\frac{dy}{dx} = \frac{-x}{y}$$

Point	Slope
$(0,0)$	und
$(0,1)$	0
$(0,2)$	0
$(0,-1)$	0
$(0,-2)$	0

Find the solution going throu

Solve $$\frac{dy}{dx} = \frac{-x}{y}$$

$$\int y\,dy = \int -x\,dx$$

$$\frac{y^2}{2} = -\frac{x^2}{2} + C \longrightarrow \text{General Solution}$$

Specific Soln through $(1,1)$:

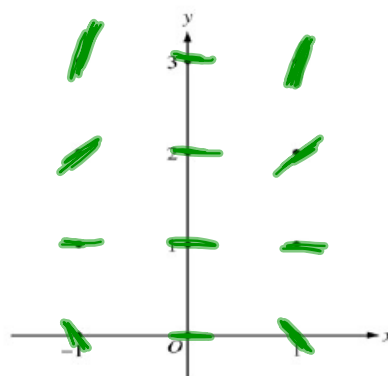$$\frac{1^2}{2} = -\frac{1^2}{2} + C$$

$$C = 1$$

$$\frac{y^2}{2} = \frac{-x^2}{2} + 1$$

$$\frac{x^2}{2} + \frac{y^2}{2} = 1 \quad \text{or} \quad x^2 + y^2 = 2$$

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

(a) On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated.
(Note: Use the axes provided in the pink test booklet.)

(b) While the slope field in part (a) is drawn at only twelve points, it is defined at every point in the xy-plane. Describe all points in the xy-plane for which the slopes are positive.

(c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 3$.

$1^2(0-1) = -1 \qquad (-1)^2(6-1)$

$1^2(2-1) = 1 \qquad \qquad -1$

$1^2(3-1) = 2$