Slope Field WS Solutions

Tuesday, December 2, 2014 7:38 AM

BC Calculus
Slopefield Worksheet

Name KEY

Match each slopefield with the differential equations below.

D 1) $\frac{dy}{dx} = 2x + 2$

H 2) $\frac{dy}{dx} = x - y$

A 3) $\frac{dy}{dx} = y$

F 4) $\frac{dy}{dx} = \cos(x)$

J 5) $\frac{dy}{dx} = Ln|x - 1|$

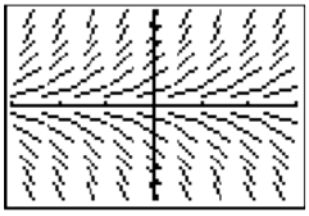
G 6) $\frac{dy}{dx} = \frac{1}{x^{(2/3)}}$

E 7) $\frac{dy}{dx} = \frac{x}{x - 2}$

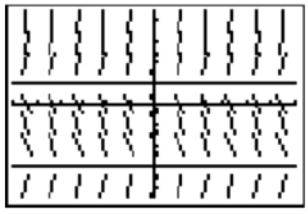
B 8) $\frac{dy}{dx} = (y - 1)(y + 3)$

C 9) $\frac{dy}{dx} = x^{\left(\frac{-1}{3}\right)}$

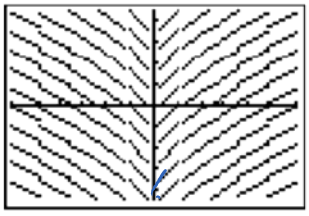
A)



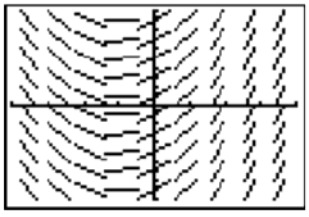
B)



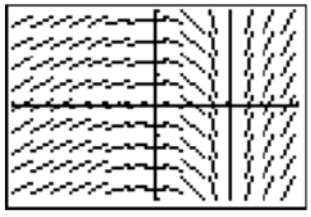
C)



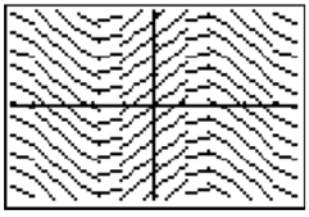
D)



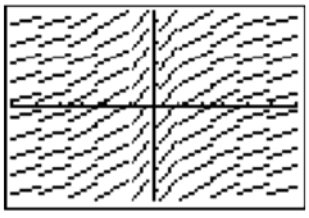
E)



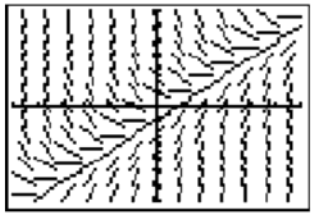
F)



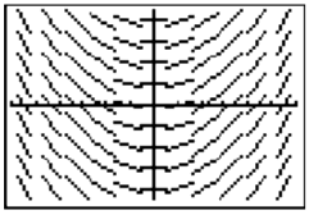
G)



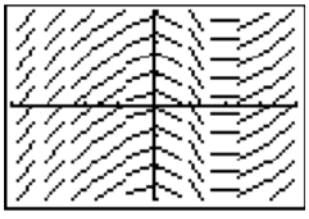
H)



I)



J)

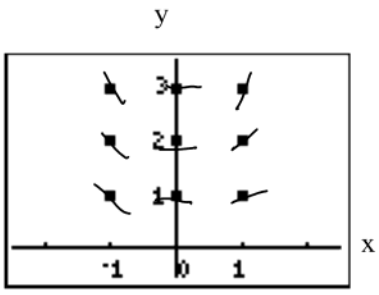


(over)

1998 BC 4 (Calculator allowed)

Consider the differential equation given by $\frac{dy}{dx} = \frac{x \cdot y}{2}$.

a) On the axes provided below, sketch a slope field for the given differential equation at the nine points indicated.



b) Let $f(x)$ be the particular solution to the given differential equation with the initial condition $f(0) = 3$. Use Euler's method starting at $x = 0$, with a step size of 0.1 to approximate $f(0.2)$. Show the work that leads to your answer.

(x, y)	Δx	dy/dx	Δy	$(x+\Delta x, y+\Delta y)$
$(0, 3)$	0.1	0	$0.1(0)=0$	$(0.1, 3)$
$(0.1, 3)$	0.1	$\frac{3}{2}=.15$	$.15(.1)=.015$	$(0.2, 3.015)$

$f(0.2) \approx 3.015$

c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 3$. Use your solution to find $f(0.2)$.

$$\int \frac{1}{y}\,dy = \int \frac{x}{2}\,dx$$

$$\ln|y| = \frac{x^2}{4} + C$$

$$y = Ce^{x^2/4}$$

$$3 = Ce^0$$

$$C = 3$$

$$y = 3e^{x^2/4}$$