Homework

Which of the following is an equation of the line tangent to the graph of $x^2 - 3xy = 10$ at the point $(1, -3)$?

(A) $y + 3 = -11(x - 1)$

(B) $y + 3 = -\frac{7}{3}(x - 1)$

(C) $y + 3 = \frac{1}{3}(x - 1)$

(D) $y + 3 = \frac{7}{3}(x - 1)$

(E) $y + 3 = \frac{11}{3}(x - 1)$

Point, slope

Point: $(1,-3)$

$Y+3=\frac{11}{3}(x-1)$

$2x-3x\frac{dy}{dx}-3y=0$

$-3x\frac{dy}{dx}=-2x+3y$

$\frac{dy}{dx}=\frac{-2x+3y}{-3x}$

$\frac{dy}{dx}=\frac{-2(1)+3(-3)}{-3(1)}$

$=\frac{-11}{-3}=\frac{11}{3}$

4. Line L is tangent to the curve defined by $2xy^2 - 3y = 18$ at the point $(3, 2)$. The slope of line L is

(A) $\frac{21}{8}$ (B) $\frac{32}{3}$ (C) $-\frac{10}{21}$ (D) $\frac{8}{21}$ (E) $\boxed{-\frac{8}{21}}$

$2x \cdot 2y\frac{dy}{dx}+2y^2-3\frac{dy}{dx}=0$

$4xy\frac{dy}{dx}-3\frac{dy}{dx}=-2y^2$

$\frac{dy}{dx}(4xy-3)=-2y^2$

$\frac{dy}{dx}=\frac{-2y^2}{4xy-3}=\frac{-2(2)^2}{4(3)(2)-3}=\boxed{\frac{-8}{21}}$

5. If $3x^2 - 2xy + y^2 = 2$, then the value of $\frac{dy}{dx}$ at $x = 1$ is

(A) -2 (B) 0 (C) 2 (D) 4 (E) not defined

$6x+2x\frac{dy}{dx}+2y+2y\frac{dy}{dx}=0$

$2x\frac{dy}{dx}+2y\frac{dy}{dx}=-6x-2y$

$\frac{dy}{dx}=\frac{-6x-2y}{2x+2y}$

$\frac{dy}{dx}=\frac{-6+2}{2-2}=\frac{-4}{0}$

need y-value: $x=1$

$3+2y+y^2=2$

$y^2+2y+3=2$

$y^2+2y+1=0$

$(y+1)^2=0$

$y=-1$

6. If $x^3 + 2x^2y - 4y = 7$, then when $x = 1$, $\frac{dy}{dx} =$

(A) $-\frac{9}{2}$. (B) 0.

(C) -8. (D) -3.

(E) $\frac{7}{2}$.

$3x^2+2x^2\frac{dy}{dx}+4xy-4\frac{dy}{dx}=0$

$2x^2\frac{dy}{dx}-4\frac{dy}{dx}=-3x^2-4xy$

$\frac{dy}{dx}=\frac{-3x^2-4xy}{2x^2-4}$

$x=1$

$1+2y-4y=7$

$1-2y=7$

$-2y=6$

$y=-3$

$(1,-3)$

$\frac{dy}{dx}=\frac{-3-4(1)(-3)}{2-4}$

$\frac{dy}{dx}=\frac{-3+12}{-2}=\frac{9}{-2}$

If $x^2 + xy + y^3 = 0$, then, in terms of x and y, $\frac{dy}{dx} =$

(A) $-\frac{2x+y}{x+3y^2}$ (B) $-\frac{x+3y^2}{2x+y}$ (C) $\frac{-2x}{1+3y^2}$ (D) $\frac{-2x}{x+3y^2}$ (E) $-\frac{2x+y}{x+3y^2-1}$

$2x + x\frac{dy}{dx} + y + 3y^2\frac{dy}{dx} = 0$

$x\frac{dy}{dx} + 3y^2\frac{dy}{dx} = -2x - y$

$\frac{dy}{dx} = \frac{-2x-y}{x+3y^2} = -\frac{2x+y}{x+3y^2}$

If $xy^2 + 2xy = 8$, then, at the point $(1, 2)$, y' is

(A) $-\frac{5}{2}$ (B) $-\frac{4}{3}$ (C) -1 (D) $-\frac{1}{2}$ (E) 0

$x \cdot 2y\frac{dy}{dx} + y^2 + 2x\frac{dy}{dx} + 2y = 0$ $(1,2)$

$2xy\frac{dy}{dx} + 2x\frac{dy}{dx} = -y^2 - 2y$ $\frac{dy}{dx} = \frac{-4-2(2)}{4+2} = \frac{-4-4}{6} = \frac{-8}{6} = \frac{-4}{3}$

$\frac{dy}{dx} = \frac{-y^2-2y}{2xy+2x}$

If $y^2 - 2xy = 16$, then $\frac{dy}{dx} =$

(A) $\cancel{\frac{x}{y-x}}$ (B) $\frac{y}{x-y}$ (C) $\frac{y}{y-x}$ (D) $\cancel{\frac{y}{2y-x}}$ (E) $\cancel{\frac{2y}{x-y}}$

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

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

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