Name: Mr. Konichek Quiz 4: Ch 3.6

Draw a box around your final answers. No partial credit will be given.

#1

1. Find $\frac{dy}{dx}$ *if* $x+2y=5$

$$1+2\frac{dy}{dx}=0$$

$$\boxed{\frac{dy}{dx}=-\frac{1}{2}}$$

#9

2. Find $\frac{dy}{dx}$ *if* $x^2+y^2=16$

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

$$\frac{dy}{dt}=-\frac{2x}{2y}=\boxed{-\frac{x}{y}}$$

1st half of #35

3. Find $\frac{dy}{dx}$ *if* $xy=1$

$$y(1)+x\frac{dy}{dx}=0$$

if $xy=1$

then $y=\frac{1}{x}$

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

$$\frac{dy}{dx}=\frac{-\left(\frac{1}{x}\right)}{\left(\frac{x}{1}\right)}=-\left(\frac{1}{x}\right)\left(\frac{1}{x}\right)=\boxed{-\frac{1}{x^2}}$$

Part b
#5

4. Find $\frac{dy}{dx}$ *if* $x^3 - x^2 - xy = 4$

$$3x^2 - 2x - \left[y(1) + x\frac{dy}{dx}\right] = 0$$

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

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

$$\boxed{\frac{dy}{dx} = \frac{(3x^2 - 2x - y)}{x}}$$

OR $\frac{\cancel{x}(3x-2) - \frac{y}{x}}{\cancel{x}}$

so $\boxed{3x - 2 - \frac{y}{x}}$

#15

5. Find $\frac{dy}{dx}$ *if* $x^2y^2 - xy = 8$

$$y^2(2x) + x^2\left(2y\frac{dy}{dx}\right) - \left[y(1) + x\frac{dy}{dx}\right] = 0$$

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

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

$$\frac{dy}{dx} = \frac{y - 2xy^2}{2x^2y - x} = \frac{y(1-2xy)}{x(2xy-1)}$$

$$\frac{dy}{dx} = \frac{-y\cancel{(2xy-1)}}{x\cancel{(2xy-1)}} = \boxed{-\frac{y}{x}}$$

6. Find $\frac{dy}{dx}$ *if* $3x+4y=6$

Part b
#2

$$3 + 4\frac{dy}{dx} = 0$$

$$\boxed{\frac{dy}{dx} = -\frac{3}{4}}$$

like
~~#13~~
#11
Note
(Same answer)

7. Find $\frac{dy}{dx}$ *if* $x^2-2y^2=7$

$$2x - 4y\frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = \frac{-2x}{-4y} = \boxed{\frac{x}{2y}}$$

#12

8. Find $\frac{dy}{dx}$ *if* $x^3+y^3+y-4=0$

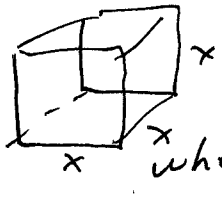
$$3x^2 + 3y^2\frac{dy}{dx} + \frac{dy}{dx} - 0 = 0$$

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

$$\frac{dy}{dx} = \boxed{-\frac{3x^2}{(3y^2+1)}}$$

9. The volume V of a cube with sides of length x inches is changing with respect to time. At a certain instant of time, the sides of the cube are 4 inches long and increasing at a rate of 0.3 inches/sec. How fast is the volume of the cube changing at that instant of time?

like #50



$V = x^3$

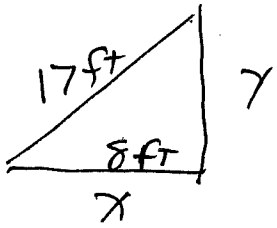
when $x = 4$ inches ; $\frac{dx}{dt} = 0.3 \frac{in}{sec}$; $\frac{dV}{dt} = ?$

$$\frac{dV}{dt} = 3x^2 \frac{dx}{dt} = 3\,(4\text{inches})^2 \left(0.3 \frac{\text{inches}}{\text{sec}}\right) = \boxed{14.4 \frac{\text{inches}^3}{\text{sec}}}$$

16 inches^2

10. The base of a 17-ft ladder leaning against a wall begins to slide away from the wall. At the instant of time when the base is 8 ft from the wall, the base is moving at a rate of 8 ft/sec. How fast is the top of the ladder sliding down the wall at that instant of time?

like #'s 64 & 65



$x^2 + y^2 = (17\text{ft})^2$

when $x = 8$ ft

$8^2 + y^2 = 17^2$

$y^2 = 17^2 - 8^2$

$y^2 = 289 - 64 = 225$

$y = 15$ ft

when $\frac{dx}{dt} = 8 \frac{ft}{sec}$; $\frac{dy}{dt} = ?$

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

$$\frac{dy}{dt} = -\frac{\cancel{2}x\left(\frac{dx}{dt}\right)}{\cancel{2}y} = -\frac{(8\,\cancel{ft})\left(8\frac{\cancel{ft}}{sec}\right)}{15\,\cancel{ft}} = \boxed{\frac{64}{15}\frac{ft}{sec}}$$

OR $4.2\overline{6} \frac{ft}{sec}$