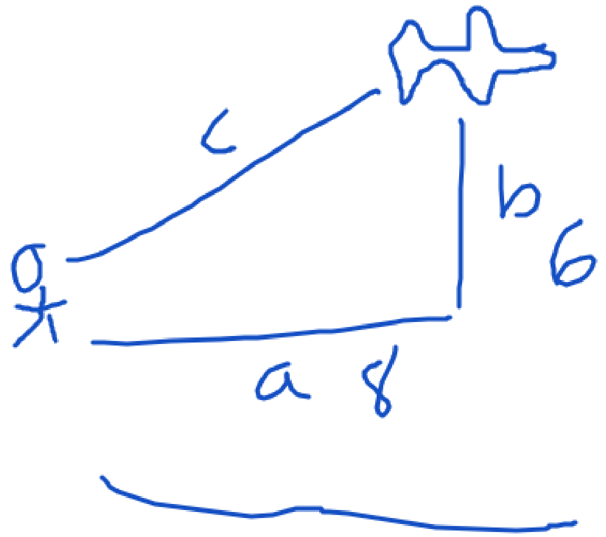
VA #1

A plane is flying 400 mph at an alt. of 6 miles how fast is the distance b/w you increasing when the plane is above a point 8 miles from you?

Ver B, 300



$a = 8$ $\quad b = 6$ $\quad c = 10$

$\frac{da}{dt} = 400$ $\quad \frac{db}{dt} = 0$ $\quad \frac{dc}{dt} = ?$

$c^2 = a^2 + b^2$

$= 64 + 36 = 100$

$$a^2+b^2=c^2$$

$$2a\frac{da}{dt}+2b\frac{db}{dt}=2c\frac{dc}{dt}$$

8 400 6 0 10

$$2(8)(400)=2(10)\frac{dc}{dt}$$

$$=\boxed{320=\frac{dc}{dt}}$$

Ver B: $\boxed{180}$

VB #2 $P(t) = 2000\left(1 + \frac{t}{64+t^2}\right)$

$\boxed{\text{increasing}}$ or decreasing @ $t = 6$?

$$P'(t) = 2000\left(\frac{(64+t^2) - t(2t)}{(64+t^2)^2}\right)$$

$$= 2000\left(\frac{64-t^2}{(64+t^2)^2}\right)$$

$t=6$ $\quad P'(6) = 2000\left(\frac{64-36}{(64+36)^2}\right) = \boxed{2000\left(\frac{28}{10000}\right) > 0}$ $\rightarrow 5.6 > 0$

Ver. A: $-2.8 < 0 \rightarrow$ decreasing

VA #3

x	f	f'	g	g'
1	2	7	3	-1
2	1	-3	1	-5
3	5	4	0	1

a) $A(x) = f(x) + g(x)$, $A'(1) = ?$ 3

$A'(x) = f'(x) + g'(x)$

$A'(1) = f'(1) + g'(1)$

$= 7 - 1 = \boxed{6}$

b) $B(x) = f(x)g(x)$, $B'(3) = ?$

$= f'(x)g(x) + g'(x)f(x)$

$= 4(0) + (1)(5) = \boxed{5}$

c) $C(x) = \frac{f(x)}{g(x)}$, $C'(2) = ?$

$$C'(x) = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$$

$$= \frac{(1)(-3) - (1)(-5)}{(1)^2}$$

$$= -3 + 5 = \boxed{2}$$

D) $D(x) = f(g(x))$, $D'(\underset{2}{2}) = ?$

$$\underset{2}{D'(x)} = f'(g(x))\,g'(x)$$

$$= f'(\underset{1}{g(2)})\,g'(2)$$

$$= f'(1)\,g'(2)$$

$$= 7 \cdot (-5) = \boxed{-35}$$

Ver B

a) 5 b) -8 c) $\frac{23}{9}$ d) -4

x	f	f'	g	g'
2	1	-3	1	-5

VB #4 find vertical tangent lines of

$$x^2+y^3=1-x^2y^3$$

$$x^2=1 \rightarrow x=1,\ x=-1$$

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

$$3y^2+3x^2y^2=0$$

$$\boxed{3y^2(1+x^2)}=0$$

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

$$y=0$$

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

$$\boxed{(1,0) \text{ and } (-1,0)}$$

$$3y^2=-3x^2y^2 \rightarrow 1=-x^2 \rightarrow x^2=-1$$

VA #5 differentiate

$$y = [\cos(x)]^{\ln(x)}$$

$$\ln(y) = \ln(x)\ln(\cos(x))$$

$$\frac{1}{y}y' = \frac{1}{x}\ln(\cos(x)) + \ln(x)\frac{1}{\cos(x)}[-\sin(x)]$$

$$\boxed{y' = \left[\frac{\ln(\cos(x))}{x} - \ln(x)\tan(x)\right][\cos(x)]^{\ln(x)}}$$