AP Calculus AB **Trig Quiz #2 Review Worksheet 1**

1) If $y = \cos^3(\pi x^2)$, find $\frac{dy}{dx}$

2) Given $y = \dfrac{\sin(\pi x)}{\cos(2\pi x)}$ Evaluate $y'(0)$

3) If $\dfrac{\sin(x)}{3\cos(y)} = 2x$ find $\frac{dy}{dx}$

4) If $[\sin(\pi x) + \cos(\pi y)]^2 = 2$ find $\frac{dy}{dx}$

5) If velocity of a particle is $v(t) = \sin(2t)\tan(t)$,

a) Find a(t)

b) find acceleration at $t = \pi$

6. Find the equation of the tangent line at $x = \frac{\pi}{4}$ for $y = 2tan^3x$

AP Calculus AB **Trig Quiz #2 Review** **Name:** Key

*chain rule
*quotient rule $f'g - fg'$

1) If $y = \cos^3(\pi x^2)$, find $\frac{dy}{dx}$

$$y = [\cos(\pi x^2)]^3$$

$$y' = 3[\cos(\pi x^2)]^2 \cdot -\sin(\pi x^2) \cdot \pi(2x)$$

$$y' = -6\pi x[\cos(\pi x^2)]^2 \sin(\pi x^2)$$

or

$$y' = -6\pi x \cos^2(\pi x^2) \sin(\pi x^2)$$

2) Given $y = \frac{\sin(\pi x)}{\cos(2\pi x)}$ Evaluate $y'(0)$

$$y' = \frac{\overbrace{\cos(\pi x)\cdot\pi}^{f'}\,\overbrace{\cos(2\pi x)}^{g} - \overbrace{\sin(\pi x)}^{f}\cdot\overbrace{-\sin(2\pi x)\cdot 2\pi}^{g'}}{\underbrace{[\cos(2\pi x)]^2}_{g^2}}$$

$$y'(0) = \frac{\pi\cos 0 \cdot \cos 0 - \sin(0)\cdot(-\sin 0)\cdot 2\pi}{(\cos 0)^2}$$

$$= \frac{\pi}{1} = \boxed{\pi}$$

3) If $\frac{\sin(x)}{3\cos(y)} = 2x$ find $\frac{dy}{dx}$

*quotient
*implicit

$$\frac{\cos x\cdot 3\cos y - \sin x\cdot(-3\sin y)\left(\frac{dy}{dx}\right)}{(3\cos y)^2} = 2$$

$$3\cos x\cos y + 3\sin x\sin y\left(\frac{dy}{dx}\right) = 2\cdot 9\cos^2 y$$

$$\frac{dy}{dx}(3\sin x\sin y) = 18\cos^2 y - 3\cos x\cos y$$

$$\frac{dy}{dx} = \frac{18\cos^2 y - 3\cos x\cos y}{3\sin x\sin y} = \boxed{\frac{6\cos^2 y - \cos x\cos y}{\sin x\sin y}}$$

4) If $[\sin(\pi x) + \cos(\pi y)]^2 = 2$ find $\frac{dy}{dx}$

*chain
*implicit

$$\cancel{2[\sin(\pi x) + \cos(\pi y)]}\cdot\left[\cos(\pi x)\cdot\pi - \sin(\pi y)\cdot\pi\left(\frac{dy}{dx}\right)\right] = 0$$

$$\pi\cos(\pi x) - \frac{dy}{dx}(\pi\sin(\pi y)) = 0$$

$$-\frac{dy}{dx}(\pi\sin(\pi y)) = -\pi\cos(\pi x)$$

$$\frac{dy}{dx} = \frac{-\pi\cos(\pi x)}{-\pi\sin(\pi y)} = \boxed{\frac{\cos(\pi x)}{\sin(\pi y)}}$$

5) If velocity of a particle is v(t) = sin(2t)tan(t),

*product rule $f'g + fg'$
*chain rule

a) Find a(t)

$$a(t) = \cos(2t)\cdot 2\tan(t) + \sin(2t)\sec^2(t)\cdot(1)$$

$$a(t) = 2\cos(2t)\tan(t) + \sin(2t)\sec^2(t)$$

b) find acceleration at t = π

$$a(\pi) = 2\cos(2\pi)\tan(\pi) + \sin(2\pi)\sec^2(\pi)$$

$$= 2(1)(0) + (0)(-1)^2 = \boxed{0}$$

6) Find equation of tangent line at $x = \pi/4$ for $y = 2\tan^3 x$

$$y = 2[\tan x]^3$$

$$y' = 2\cdot 3[\tan x]^2\sec^2 x$$

$$y' = 6[\tan x]^2[\sec x]^2$$

$$y'(\pi/4) = 6[\tan(\pi/4)]^2[\sec(\pi/4)]^2$$

$$= 6(1)(\sqrt{2})^2 = 12$$

point: $y(\pi/4) = 2[\tan(\pi/4)]^3 = 2(1)^3 = 2$

point: $(\pi/4, 2)$ slope: $m = 12$

$$\boxed{y - 2 = 12(x - \pi/4)}$$

AP Calculus AB Trig Quiz #2 Review Name: [illegible]

1) If $y = \cos^3(\pi x^2)$, find $\frac{dy}{dx}$

$$y = [\cos(\pi x^2)]^3$$

$$y' = 3[\cos(\pi x^2)]^2 \cdot -\sin(\pi x^2) \cdot 2\pi x$$

$$= \boxed{-6\pi x \cos^2(\pi x^2)\sin(\pi x^2)}$$

2) Given $y = \frac{\sin(\pi x)}{\cos(2\pi x)}$ Evaluate $y'(0)$

$$y' = \frac{[\cos(\pi x)\cdot\pi][\cos(2\pi x)] - [\sin(\pi x)][-\sin(2\pi x)\cdot 2\pi]}{[\cos(2\pi x)]^2}$$

$$y'(0) = \frac{[\cos 0 \cdot \pi][\cos 0] - [\sin 0][-\sin 0 \cdot 2\pi]}{(\cos 0)^2}$$

$$= \frac{\pi - 0}{1} = \boxed{\pi}$$

3) If $\frac{\sin(x)}{3\cos(y)} = 2x$ find $\frac{dy}{dx}$

$$\frac{[\cos(x)][3\cos(y)] - [\sin(x)][-3\sin y \frac{dy}{dx}]}{(3\cos y)^2} = 2$$

$$3\cos x\cos y + \frac{dy}{dx}(3\sin x\sin y) = 2\cdot(3\cos y)^2$$

$$\frac{dy}{dx}(3\sin x\sin y) = 18\cos^2 y - 3\cos x\cos y$$

$$\frac{dy}{dx} = \frac{18\cos^2 y - 3\cos x\cos y}{3\sin x\sin y} = \boxed{\frac{6\cos^2 y - \cos x\cos y}{\sin x\sin y}}$$

4) If $[\sin(\pi x) + \cos(\pi y)]^2 = 2$ find $\frac{dy}{dx}$

$$2[\sin(\pi x) + \cos(\pi y)]\cdot[\cos(\pi x)\cdot\pi + -\sin(\pi y)\cdot\pi\frac{dy}{dx}] = 0$$

$$\pi\cos(\pi x) - \frac{dy}{dx}\pi\sin(\pi y) = 0$$

$$-\frac{dy}{dx}\pi\sin(\pi y) = -\pi\cos(\pi x)$$

$$\frac{dy}{dx} = \frac{-\pi\cos(\pi x)}{-\pi\sin(\pi y)} = \boxed{\frac{\cos(\pi x)}{\sin(\pi y)}}$$

5) 5. If velocity of a particle is $v(t) = \sin(2t)\tan(t)$.

a) Find a(t)

$$a(t) = [\cos(2t)\cdot 2][\tan t] + [\sin(2t)]\sec^2 t$$

b) find acceleration at $t = \pi$

$$a(\pi) = 2\cos(2\pi)\tan(\pi) + \sin(2\pi)\sec^2(\pi)$$

$$= 2(1)(0) + (0)(-1)^2$$

$$= \boxed{0}$$

$$2[\sin(\pi x) + \cos(\pi y)]\cdot\pi\cos(\pi x) - 2[\sin(\pi x) + \cos(\pi y)]\pi\sin(\pi y)\frac{dy}{dx} = 0$$

$$-2[\sin(\pi x) + \cos(\pi y)]\pi\sin(\pi y)\frac{dy}{dx} = -2[\sin(\pi x) + \cos(\pi y)]\pi\cos(\pi x)$$

$$\frac{dy}{dx} = \frac{-2[\sin(\pi x) + \cos(\pi y)]\pi\cos(\pi x)}{-2[\sin(\pi x) + \cos(\pi y)]\pi\sin(\pi y)} = \frac{\cos(\pi x)}{\sin(\pi y)}$$