AP Calculus AB **Trig Quiz #2 (Chapter 2)** **REVIEW** **Name:** Ans. Key

No Calculators. Leave all answers reasonably simplified

1. If $y = 4x^3 \tan(4x^3)$ find $\frac{dy}{dx}$.

$(u)(v)$

$u\ v' \qquad +v\ u'$

$4x^3\left(12x^2 \sec^2(4x^3)\right) + \tan(4x^3)(12x^2)$

$$48x^5 \sec^2(4x^3) + 12x^2 \tan(4x^3)$$

2. If $y = \frac{\csc(4x)}{\cot(3x)}$ find $\frac{dy}{dx}$.

$$\frac{\cot(3x)\cdot 4(-\csc(4x)\cot 4x) - \csc 4x\left(3(-\csc^2(3x))\right)}{(\cot(3x))^2}$$

$$= \frac{3\csc(4x)\csc^2(3x) - 4\cot(3x)\csc(4x)\cot(4x)}{\cot^2(3x)}$$

3. If $\cot(y) = 3x\sin(5x)$ find $\frac{dy}{dx}$.

$-\csc^2(y)\frac{dy}{dx} = (3x)(5\cos 5x) + (3)(\sin 5x)$

$$\frac{dy}{dx} = -\frac{15x\cos 5x + 3\sin 5x}{\csc^2(y)}$$

4. $y = \frac{4}{3}\tan(4\theta)$ find $\frac{dy}{d\theta}$.

$\frac{dy}{d\theta} = \frac{4}{3}\left(4\sec^2(4\theta)\right)$

$$= \frac{16\sec^2 4\theta}{3}$$

5. Find the equation of the tangent line to the curve $y = \csc x$ at $x = \frac{2\pi}{3}$

$\csc 2\pi/3 = \frac{2\sqrt{3}}{3}$

$\frac{dy}{dx} = -\csc x \cot x \quad \text{at } x = 2\pi/3$

$= -\csc 2\pi/3 \cot 2\pi/3 = -\left(\frac{2\sqrt{3}}{3}\right)\left(\frac{-\sqrt{3}}{3}\right) = \frac{2}{3}$

$\therefore$ Tangent line $\left(y - \frac{2\sqrt{3}}{3}\right) = \frac{2}{3}\left(x - 2\pi/3\right)$

6. The position of a particle moving along the x-axis is given by $x(t) = \cot 2t$ find the acceleration of the particle at $t = \frac{3\pi}{4}$

$x(t) = \cot 2t$

$\therefore v(t) = x'(t) = -2\csc^2(2t) = -2u^2$ $\quad u = \csc(2t)$

$\therefore a(t) = v'(t) = (-4\csc 2t)(-2\csc(2t)(\cot(2t))$

$= 8\csc^2(2t)\cot(2t)$

$\text{when } t = 3\pi/4 = 8\csc^2 3\pi/2 \cot 3\pi/2$

$= 8(-1)^2(0)$

$= 0$