Name: Solutions _____ / 25

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. **[12 points]** Find $\frac{dy}{dx}$. You do not have to simplify

a. $y = 1 - 2x + x\sec(x)$

$$\frac{dy}{dx} = -2 + 1\cdot\sec(x) + x\sec(x)\tan(x)$$

b. $y = 8u^3,\ u = \tan(x)$

$$\frac{dy}{dx} = \frac{dy}{du}\cdot\frac{du}{dx} = 8\cdot 3u^2\cdot\sec^2 x = 24\tan^2(x)\sec^2(x)$$

c. $y = \frac{20}{\sqrt{x^3-2x}} = 20(x^3-2x)^{-1/2}$

$$\frac{dy}{dx} = 20\left(\frac{-1}{2}\right)(x^3-2x)^{-3/2}(3x^2-2) = \frac{-10(3x^2-2)}{(x^3-2x)^{3/2}}$$

d. $y = \left(x+\cos\left(\frac{x}{\pi}\right)\right)^5$

$$\frac{dy}{dx} = 5\left(x+\cos\left(\frac{x}{\pi}\right)\right)^4\left(1-\frac{1}{\pi}\sin\left(\frac{x}{\pi}\right)\right)$$

2. [5 points] Use the chart to determine the derivative of $h(x) = f(x^2+1) - `(g(x))^2$ at $x = 1$.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
0	2	-1	0	1
1	1	2	3	4
2	-1	-2	-3	-4
3	0	4	3	2

$h'(x) = f'(x^2+1)(2x) - 2(g(x))(g'(x))$

$h'(1) = f'(1^2+1)(2) - 2(g(1))(g'(1))$

$= f'(2)\cdot 2 - 2\cdot 3\cdot 4 = -2\cdot 2 - 24 = -28$

3. [8 points] Given $f(x) = (3x-8)^6 - 17x$

a. Find $f'(x)$

$f'(x) = 6(3x-8)^5 \cdot 3 - 17$

$= 18(3x-8)^5 - 17$

b. Find all x-values when the tangent line to f is parallel to $y = x - 2$.

Find x so that $f'(x) = 1$.

So $18(3x-8)^5 - 17 = 1$

$18(3x-8)^5 = 18$

$(3x-8)^5 = 1$

$3x - 8 = 1$

$3x = 9$

$x = 3$