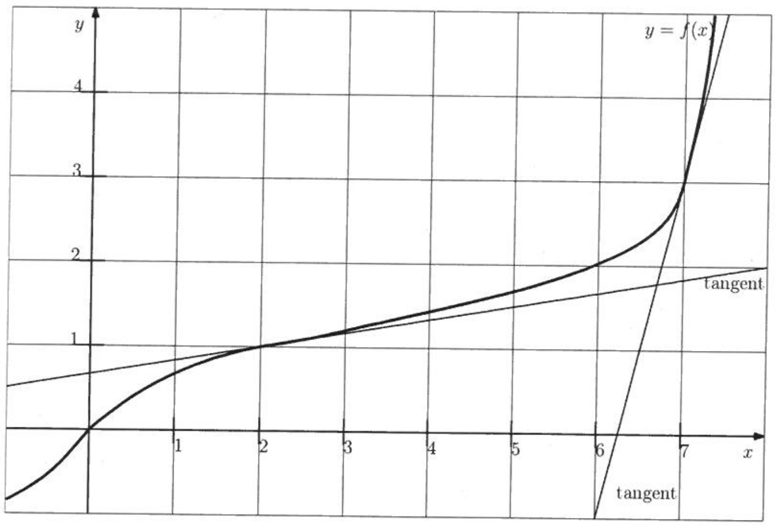
Math 1210: Quiz #5 **Fall 2017**

Name: **Solution**	A#:	Section: **I**

[8] 1. Let f be a function whose graph of $y = f(x)$ is given below and let $g = f^{-1}$ be its inverse function.



Fill in the following.

(a) $g(2) =$ 6

(b) $\lim_{h\to 0} \dfrac{f(2+h) - f(2)}{h} =$ $f'(2) = 1/6$

(c) The instantaneous rate of change of $f(x)$ when $x = 7$ is 4

(d) $g'(3) =$ $1/4$

(e) If $h(x) = f(x^3 + 1)$, then $h'(2) =$ $12f'(9)$ $\quad h'(x) = 3x^2 f'(x^3+1)$

(f) If $k(x) = g(x)\ln(x)$, then $k'(3) =$ $7/3 + \dfrac{\ln(3)}{4}$ $\quad k'(x) = \frac{1}{x}g(x) + g'(x)\ln(x)$

(g) If $F(x) = \sec(f(x))$, then $F'(2) =$ $\frac{1}{6}\sec(1)\tan(1)$ $\quad F'(x) = f'(x)\sec(f(x))\tan(f(x))$

(h) Tangent line to the curve $y = 2f(x)$ at $x = 2$ is $y = \frac{1}{3}x + \frac{4}{3}$

$m = 2f'(2) = 1/3$

$(y-2) = \frac{1}{3}(x-2)$

$y = \frac{1}{3}x + \frac{4}{3}$

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[4] 2. Compute the derivative. **Do not simplify.**

3. $\frac{d}{dt}\left(\sec(\ln(t)) + \tan^{-1}(t^2) + \sin^{-1}(e^3) + e^{t^3+3}\right)$

$$\frac{1}{t}\sec(\ln(t))\tan(\ln(t)) + 2t \cdot \frac{1}{1+(t^2)^2} + 0 + 3t^2 \cdot e^{t^3+3}$$

[8] 4. Consider the curve given by $x^2 + y = \cos(xy^2)$. Find the equation of the tangent line given to the curve at the point $(3, -2)$.

$$2x + y' = (y^2 + 2xyy')(-\sin(xy^2))$$

$$2x + y' = -y^2\sin(xy^2) - 2xyy'\sin(xy^2)$$

$$y'(1 + 2xy\sin(xy^2)) = -2x - y^2\sin(xy^2)$$

$$y' = \frac{-2x - y^2\sin(xy^2)}{1 + 2xy\sin(xy^2)}$$

at $(3,-2)$: $y' = \dfrac{-6 - 4\sin(12)}{1 - 12\sin(12)}$ = slope

$$(y - (-2)) = \frac{-6 - 4\sin(12)}{1 - 12\sin(12)}(x - 3)$$

$$y = \left(\frac{-6 - 4\sin(12)}{1 - 12\sin(12)}\right)x + \frac{3(6 + 4\sin(12))}{1 - 12\sin(12)} - 2$$

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