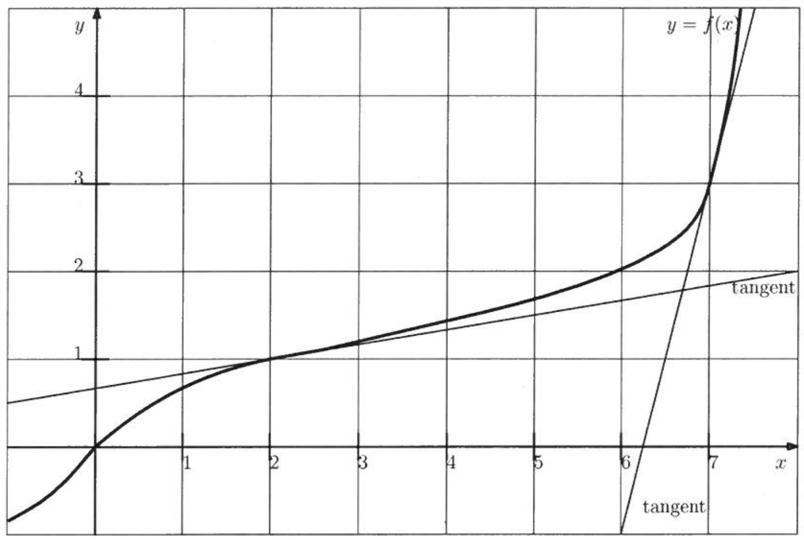
Math 1210: Quiz #5 **Fall 2017**

Name: SOLUTION	A#:	Section:

[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) $\lim_{h\to 0} \frac{f(2+h)-f(2)}{h} =$ $f'(2) = \boxed{\frac{1}{6}}$

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

(d) $g'(3) =$ $\frac{1}{f'(7)} = \boxed{\frac{1}{4}}$

(e) If $h(x) = f(2x^2-1)$, then $h'(2) =$ $4x\, f'(2x^2-1)\big|_{x=2} = 4(2)f'(7) = \boxed{32}$

(f) If $k(x) = g(x)\ln(x)$, then $k'(3) =$ $\left(g'(x)\ln(x) + \frac{g(x)}{x}\right)\Big|_{x=3} = \boxed{\frac{1}{4}\ln(3) + \frac{7}{3}}$

(g) If $F(x) = \tan^{-1}(f(x))$, then $F'(2) =$ $\frac{f'(x)}{1+(f(x))^2}\Big|_{x=2} = \frac{f'(2)}{1+1^2} = \boxed{\frac{1}{12}}$

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

$y|_{x=2} = 2f(2) = 2$

$y' = 2f'(x)$, $y'|_{x=2} = 2f'(2) = \frac{1}{3}$

v5.AB

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

3. $\frac{d}{dt}\left(\sec(e^t) + \tan^{-1}(4) + \sin^{-1}(2t) + \ln(t^4+1)\right)$

$$= \sec(e^t)\tan(e^t)\, e^t + 0 + \frac{1}{\sqrt{1-(2t)^2}}2 + \frac{4t^3}{t^4+1}.$$

[8] 4. Consider the curve given by $xy^2 = 5 + x^2 + y$. Find the equation of the tangent line given to the curve at the point $(3, -2)$.

$$y^2 + 2xyy' = 2x + y'$$

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

$$y' = \frac{2x-y^2}{2xy-1}$$

$$y'\Big|_{\substack{x=3\\y=-2}} = \frac{2(3)-(-2)^2}{2(3)(-2)-1} = \frac{2}{-13} = \boxed{-\frac{2}{13}}$$

Tangent: $\boxed{y+2 = -\frac{2}{13}(x-3)}$

v5.AB