2016 Table Question

(a) $k(3) = f(g(3)) = f(6) = 4$ $k'(3) = f'(g(3)) \cdot g'(3) = f'(6) \cdot 2 = 5 \cdot 2 = 10$ An equation for the tangent line is $y = 10(x-3)+4$.	$3 : \begin{cases} 2 : \text{slope at } x = 3 \\ 1 : \text{equation for tangent line} \end{cases}$
(b) $h'(1) = \dfrac{f(1)\cdot g'(1) - g(1)\cdot f'(1)}{(f(1))^2} = \dfrac{(-6)\cdot 8 - 2\cdot 3}{(-6)^2} = \dfrac{-54}{36} = -\dfrac{3}{2}$	$3 : \begin{cases} 2 : \text{expression for } h'(1) \\ 1 : \text{answer} \end{cases}$
(c) $\int_1^3 f''(2x)\,dx = \frac{1}{2}\left[f'(2x)\right]_1^3 = \frac{1}{2}[f'(6) - f'(2)] = \frac{1}{2}[5-(-2)] = \frac{7}{2}$	$3 : \begin{cases} 2 : \text{antiderivative} \\ 1 : \text{answer} \end{cases}$

*Additional notes:
For (a), point-slope form for your tangent line is fine.
For (c), the rubric does u-substitution with the method of changing back to x. You can also solve this problem with u-substitution and changing the bounds.

2017 Table Question

(a) $f'(x) = -2\sin(2x) + \cos x\, e^{\sin x}$ $f'(\pi) = -2\sin(2\pi) + \cos\pi\, e^{\sin\pi} = -1$	$2 : f'(\pi)$
(b) $k'(x) = h'(f(x)) \cdot f'(x)$ $k'(\pi) = h'(f(\pi)) \cdot f'(\pi) = h'(2)\cdot(-1) = \left(-\frac{1}{3}\right)(-1) = \frac{1}{3}$	$2 : \begin{cases} 1 : k'(x) \\ 1 : k'(\pi) \end{cases}$
(c) $m'(x) = -2g'(-2x)\cdot h(x) + g(-2x)\cdot h'(x)$ $m'(2) = -2g'(-4)\cdot h(2) + g(-4)\cdot h'(2) = -2(-1)\left(-\frac{2}{3}\right) + 5\left(-\frac{1}{3}\right) = -3$	$3 : \begin{cases} 2 : m'(x) \\ 1 : m'(2) \end{cases}$
(d) g is differentiable. $\Rightarrow$ g is continuous on the interval $[-5, -3]$. $\dfrac{g(-3)-g(-5)}{-3-(-5)} = \dfrac{2-10}{2} = -4$ Therefore, by the Mean Value Theorem, there is at least one value c, $-5 < c < -3$, such that $g'(c) = -4$.	$2 : \begin{cases} 1 : \dfrac{g(-3)-g(-5)}{-3-(-5)} \\ 1 : \text{justification, using Mean Value Theorem} \end{cases}$