Math 10A
Quiz 2; **Tuesday, 6/26/2018**
Time: 3 PM
Instructor: Roy Zhao **Name:** _____

Circle True or False. (1 point for correct answer, 0 if incorrect)

1. True **FALSE** If f, g, h are functions, then it is not possible to use the chain rule to find the derivative of $(f \circ g \circ h)$ because the chain rule only applies for the composition of two functions.

Solution: We can and $\frac{d}{dx}(f(g(h(x)))) = f'(g(h(x))) \cdot g'(h(x)) \cdot h'(x)$.

2. True **FALSE** The derivative of a function at a point is the same as the tangent line at that point.

Solution: The derivative is a number which is the slope of that line..

Show your work and justify your answers. Please circle or box your final answer.

3. (10 points) (a) (5 points) Let $f(x) = x^{-1}e^{1/x^2}$. Find $f'(x)$.

Solution: First using the product rule then chain rule, we have that

$$\frac{d}{dx}(x^{-1}e^{x^{-2}}) = -x^{-2}e^{x^{-2}} + x^{-1}e^{x^{-2}} \cdot \frac{-2}{x^3} = e^{x^{-2}}(-x^{-2} - 2x^{-4}).$$

(b) (3 points) Find $\dfrac{d}{dx}f^{-1}(x)$ at $(e, 1)$.

Solution: Let $g(x) = f^{-1}(x)$. Since $f(1) = e$, we know that $g(e) = 1$. Then using the formula that $g'(x) = \frac{1}{f'(g(x))}$, we have that

$$g'(e) = \frac{1}{f'(g(e))} = \frac{1}{f'(1)} = \frac{1}{e(-1-2)} = \frac{-1}{3e}.$$

(c) (2 points) Write the equation of the tangent line to $f^{-1}(x)$ at $(e, 1)$.

Solution: We calculated the slope as $\frac{-1}{3e}$ so the point slope formula gives us

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