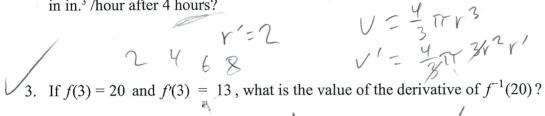
## Mu A Individual

1. Differentiate 
$$x^{x^2}$$
.

$$2x^{x^2} \qquad y = 2x \ln x + \frac{x^2}{x}$$

Roy is a slime rancher, and he's just discovered a new slime: the Rad Slime! The rate at which a Rad Slime's radioactive radius increases is 2 inches every hour when fully agitated. Assuming that the Rad Slime's aura is perfectly spherical and that the initial radius is 1 inch, at what rate is the volume of the agitated Rad Slime's aura increasing by in in.<sup>3</sup> /hour after 4 hours?





4. Find  $\lim_{\omega \to 0} \frac{(2+\omega)^6-2^6}{\omega}$ , or state if it does not exist. (This is cringe!)

$$(x)^6$$
  $6x^5$ 

5. Find  $\frac{dy}{dx}|_{x=2} x^4 + 2x^3 - 6$ .

6. Generate a point-slope form equation of a tangent line to the function  $\frac{60}{x^2}$  at x = 5.

$$60\left(\frac{-2}{\chi^3}\right)$$

- The position of a particle at time t is modeled by  $s(t) = t^3 + 12 \ln(t)$ . What is its velocity function?
- 8. If r(x) and g(x) are functions, what is the derivative of r(gr)?

## Mu A Individual

9. Does the Mean Value Theorem apply to  $f(x) = \frac{1}{3x-99}$  on [15,35]? If so, for what values?

10. Differentiate  $sin^{-1}(x^2 - 9x + 81)$ .

11. If  $z(x) = tan^{-1}(x)$ , what is z''(x)?

$$\frac{1}{1+x^2}$$

12. Is the function  $f(x) = \frac{4x+5}{9-3x}$  continuous at x = -1?

$$(1+x)^{-1}$$

$$\pm (1+x^{2}) - 2 \qquad (2x)$$

13. Find 
$$\lim_{x\to 0} (\frac{\sin(3x)}{x} - 3)$$
.

14. Find the equation of the line tangent to  $y^2e^{2x} = 3y + x^2$  at (0,3).

$$2yy'c^{2x} + 2e^{2x}y^{2} - 3y' + 2x$$

15. Find the linear approximation of the function  $f(x) = \sqrt{1-x}$  about 0 to approximate  $\sqrt{0.9}$ 

$$f(.1) = \sqrt{1 - .1} = \sqrt{.9}$$

$$(1-x)^{\frac{1}{2}}$$
 $-\frac{1}{2}(1-x)^{\frac{1}{2}}$