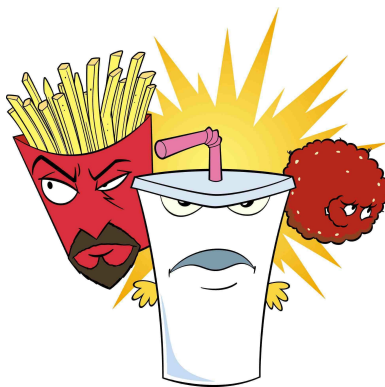


Quiz # 2 Solutions

Aqua Teen Hunger Force

December 5, 2008



Hi kids! Here are the solutions to the second quiz! Enjoy!!!

- (a) Using the product rule, $f'(x) = 2x \sin x + x^2 \cos x$.
(b) Using the quotient rule,

$$f'(x) = \frac{(x^2 - 1)(2x) - (x^2 + 1)(2x)}{(x^2 - 1)^2} = \frac{-4x}{(x^2 - 1)^2}.$$

- (c) Using the chain rule, $f'(x) = 45(2x + x^3)^{44}(2 + 3x^2)$.
(d) Using the chain rule with $\sqrt{1 - x^2} = (1 - x^2)^{1/2}$, we have

$$f'(x) = \frac{1}{2}(1 - x^2)^{-1/2} \cdot (-2x) = \frac{-x}{\sqrt{1 - x^2}}.$$

- (e) Using the chain rule with $(x^2 + 1)^{-1} = \frac{1}{x^2 + 1}$, we have

$$f'(x) = (-1)(x^2 + 1)^{-2} \cdot (2x) = \frac{-2x}{(x^2 + 1)^2}.$$

2. We recall the volume V of a sphere of radius r : $V = \frac{4}{3}\pi r^3$. Thus, since V and r are implicitly defined as functions of time, t , we have

$$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}.$$

Substituting $\frac{dV}{dt} = 2$ and $r = 6$, we have

$$2 = 4\pi(6^2) \frac{dr}{dt} \Rightarrow \frac{dr}{dt} = \frac{1}{72\pi}.$$

3. Using the product rule with implicit differentiation, we differentiate both sides with respect to x to see that

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

4. We differentiate to get $f'(x) = 6x^2 - 18x + 12 = 6(x^2 - 3x + 2) = 6(x - 1)(x - 2)$. We see that the critical points are $x = 1, 2$, and the applying the first derivative test we see that $x = 1$ is a local max, while $x = 2$ is a local min.