P.2

Carol Chang

5. Apply the Extreme Value Theorem to find the absolute extrema of $f(x) = 7 + 12x - 3x^2$ on the closed interval **[-1, 3]**

SAP

6. Apply the Mean Value Theorem to find f'(c) = slope of the secant line passing through endpoints on the closed interval **[1,3]** for the function $f(x) = x^4 - 8x$

see add'l pg

7. Given the function $f(x) = (9 / x^3)$; use the first derivative test to determine intervals where the function is increasing, decreasing, and any extrema points.

see add'l pg

8. Given the function $f(x) = (x^2 - 1)^2$; use the second derivative test to determine the intervals of concavity and the x-value of any Points Of Inflection (POI). Include the derivatives, critical values, and test regions as part of your response.

SAP

P-3. cool Chris

9. A street vendor in New York City sells hot dogs for $3.00 each. Therefore, his revenue function is R(x) = 3x. His fixed cost for maintaining his stand each day is $50.00 and his variable cost, or the materials needed to make the hot dogs, is $2.00 per hot dog sold. Therefore, his daily cost function is C(x) = 50 + 2x.
    a. Determine the formula for profit P(x)
    b. Determine the marginal profit function P'(x)
    c. What does your answer for P'(x) mean?

seen

10. A 10-foot ladder is leaned up against a building. The ladder begins to slide away from the building at a rate of 2 ft/sec. Calculate the rate of decent of the top of the ladder when the base of the ladder is 6 feet from the building: (Note: use the Pythagorean Theorem as your base function)

seen

P.R

Chain Rule

① $f(x) = \sqrt{x^2+4x}$

$= \frac{1}{2}(x(x+4))^{\frac{1}{2}-1} \cdot \frac{d}{dx}[x(x+4)]$

$= \frac{d}{dx}[x] \cdot (x+4) + x \cdot \frac{d}{dx}[x+4]$

$= 1(x+4) + x\left(\frac{d}{dx}[x] + \frac{d}{dx}[4]\right)$

$2\sqrt{x(x+4)}$

$= \frac{x(1+0)+x+4}{2\sqrt{x(x+4)}}$

$= \frac{2x+4}{2\sqrt{x(x+4)}}$

$= \frac{x+2}{\sqrt{x(x+4)}}$

(2) $f(x) = [(x-1)/(2x+3)]^3$.

Cap (a) p.5

$$= \frac{(x-1)^3}{(2x+3)^3} \Rightarrow$$

$$\Rightarrow \frac{3(x-1)^2}{(2x+3)^3} - \frac{6(x-1)^2}{2(x+3)^4}$$

$$\Rightarrow \frac{15(x-1)^2}{(2x+3)^4}$$

(9) $y^2 = x^3 - 26y$ (3, 1) P6 carol chagg

$= y \cdot y' = 3x^2 - 26y'$

$\frac{dx}{dx}$ $\frac{dx}{dx}$

$\frac{dy}{dx} = \frac{3x^2}{2(y+13)}$

$= \frac{3(3)^2}{2(1+13)}$

$= \frac{27}{2(14)} = \frac{27}{28}$

(5) $f(x) = 7 + 12x - 3x^2$ $[-1, 3]$ P-1 Carl Chay

$0 = 12 - 6x$

$0 = 6(2 - x)$

$12 - 0 = 6x$

$12 = 6x$

$x = 2$

$= 7 + 12 \cdot 2 - 3 \cdot 2^2$

$= 7 + 24 - 12$

~~$= 31 - 12$~~

$= 31 - 12 = 19$

2 is inside $[1, 3]$

maximum = 19

P.18 Calc I Chapter

(6) $f(x) = x^4 - 8x$ on $[1, 3]$

$f'(x) = 4x^3 - 8$

$$f'(c) = \frac{f(3) - f(1)}{3 - 1}$$

$$3c^2 + 8 = \frac{51 - (-7)}{2} = \frac{64}{2}$$

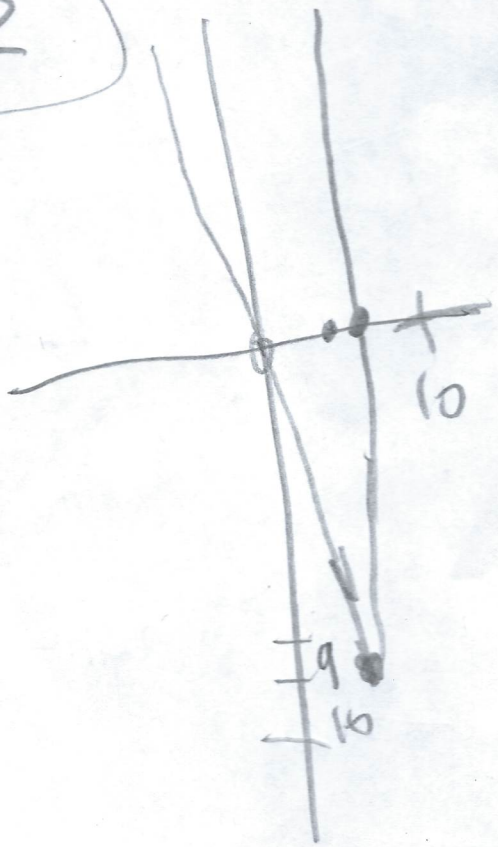
$$f'(c) = 32$$

$$32 = 4c^3 - 8$$

$$\Rightarrow 4c^3 = 40$$

$$c^3 = 10$$

$$c = \sqrt[3]{10}$$



Calc I Chapter

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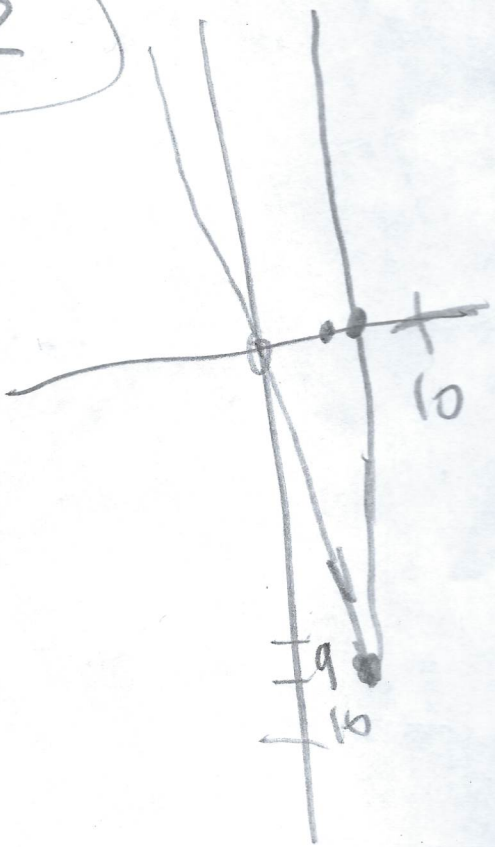

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(7) $f(x) = (9/x^3)$

$$= \frac{d}{dx}\left[\frac{9}{x^3}\right]$$

$$= 9 \cdot \frac{d}{dx}\left[\frac{1}{x^3}\right]$$

$$= 9(-3)x^{-4}$$

$$= \frac{-27}{x^4}$$

=

(8) $\frac{d}{dx}(x^2-1)^2$ p-10 — 1st deriat

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$= 2(x^2-1) \cdot \frac{d}{dx}[x^2-1]$

$= 2(x^2-1)\left(\frac{d}{dx}[x^2+\frac{d}{dx}(-1)]\right)$

$= 2(x^2-1)(2x+0)$

$= 4x(x^2-1)$ — 1st deriatve

2nd der. $= \left[\frac{d}{dx}\right][4x(x^2-1)]$

$= 4 \cdot \frac{d}{dx}[x(x^2-1)]$

$= 4\left(\frac{d}{dx}(x) \cdot (x^2-1) + x \cdot \frac{d}{dx}(x^2-1)\right)$

$= 4\left(1(x^2-1) + x\left(\frac{d}{dx}(x^2) + \frac{d}{dx}(-1)\right)\right)$

$= 4(x^2+x(2x+0)-1)$

$= 4(3x^2-1)$

$= 8x^2+4(x^2-1)$

$= 2x^2-4$

(9)

(a) $P(x) = R(x) - C(x) = 3x - 50 - 2x = x - 50$

P-ll Cost Chg

(b) $P(x) = \frac{dt}{dx} = 1$

(c) Profit earned by the vendor when one additional hotdog is sold

(10) P.R Car O/ Chang

$x^2 + y^2 = 100$

$\Rightarrow 2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$

$\Rightarrow \frac{dy}{dt} = \frac{-2x}{2y}\frac{dx}{dt}$

$y = 8$

$\frac{dy}{dt} = \frac{-2 \cdot 6}{2 \cdot 8}\frac{dx}{dt} = \frac{-12}{16}\frac{dx}{dt}$

$= \frac{-12}{16}, 2 = \frac{-24}{16}$

rate $= \left|\frac{-3}{2}\right| = \frac{3}{2}$