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10.4 Homework probs

9. $R(m) = m^2\left(\frac{c}{2} - \frac{m}{3}\right) = \frac{c}{2}\cdot m^2 - \frac{m^3}{3}$

$R' = 2\cdot\frac{c}{2}\cdot m' - 3\cdot\frac{m^2}{3}$

$R' = cm - m^2$

$0 = cm - m^2$

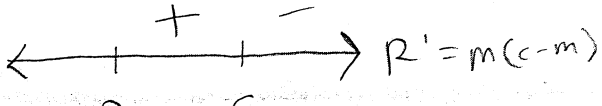
$m(c-m) = 0$

$\boxed{m = 0}$ $c - m = 0$

$\boxed{m = c}$

↑ Crit pnts. ↗

inc dec



max! Hooo-wheee!

C is where the max occurs.

$R(c) = c^2\left(\frac{c}{2} - \frac{c}{3}\right)$

$= \frac{1}{2}c^3 - \frac{1}{3}c^3$

$= \frac{1}{6}c^3$

c units of medicine absorbed

Quiz

10.2 - 10.4

10. $\frac{dR}{dm} = R' = cm - m^2$

b. (maximise) $c - 2m$

$\log_5 25 = 2 \Leftrightarrow 5^2 = 25$

$\log_{10} 1000 = 3 \Leftrightarrow 10^3 = 1000$

$\text{Base}^{\text{Power}} = \text{Result}$

$\log_{\text{base}}^{\text{Result}} = \text{Power}$

$\ln = \log_e$ $\quad \ln 10 = 2.30$

$e^x =$

$e^1 = 2.718$ $\quad \log_5 28 = \frac{\ln 28}{\ln 5} = 2.070$

perties of logs

$\log_B N = \frac{\ln N}{\ln B}$

$\ln(e^x) = x$ $\quad \ln e^7 = 7$ $\quad \ln e^{x^2+2} = x^2+2$

$e^{\ln x} = x$ $\quad e^{\ln 7} = 7$ $\quad e^{\ln x^2+5} = x^2+5$

$\ln(A \cdot B) = \ln A + \ln B$

$\ln\left(\frac{A}{B}\right) = \ln A - \ln B$

$\ln(A^B) = B \cdot \ln A$

thod 2: $y = \ln x^3$

$y = 3 \cdot \ln x$

Deritative of logs

1. If $y = \ln x$, $y' = \frac{1}{x}$

2. chain rule: If $y = f(x)$, $y' = \frac{f'(x)}{f(x)}$

$y = \ln(x^3 + x - 8)$

$y' = \frac{3x^2+1}{x^3 - x - 8}$

$y = 5 \cdot x^3$

$y' = 15x^2$

$y = \ln(x^3)$

method 1: $y' = \frac{3x^2}{x^3 x} = \frac{3}{x}$

$y = 5 \ln x$

$y' = 5 \cdot \frac{1}{x} = \frac{5}{x}$

pg. 775 #1-11, 19-37, 43, 45
ODDS!

8. $y = \ln(6x+1)$

$y' = \frac{6}{6x+1}$

10. $y = \ln(8x^3 - 2x) - 2x$

$y' = \frac{24x^2 - 2}{8x^3 - 2x} - 2$ leave it! Don't simplify!

18. b. $y = \ln\left(\frac{x^3}{x+1}\right)$

$y = \ln x^3 - \ln(x+1)$

$y' = 3\ln x - \frac{1}{x+1}$

$y' = \frac{3}{x} - \frac{1}{x+1}$

20. $\frac{ds}{dt}$ $y = \ln[t^3(t^2-1)]$

$y = \ln t^3 + \ln(t^2-1)$

$y' = 3\ln t + $

$y' = \frac{3}{t} + \frac{2t}{t^2-1}$

Method 3:

$D = \ln[t^3(t^2-1)]$

$= \ln(t^5 - t^3)$

$D = \frac{5t^4 - 3t^2}{t^5 - t^3}$

Almost 30:

$y = \ln\sqrt{3x+1}$

$y = (3x+1)^{1/2}$

prop 6: $y = \frac{1}{2}\ln(3x+1)$

$y' = \frac{1}{2} \cdot \frac{3}{3x+1}$

34. $y = \sqrt{\ln(3x+1)}$

$y = (\ln(3x+1))^{1/2}$

$y' = \frac{1}{2}(\ln(3x+1))^{-1/2} \cdot \frac{3}{3x+1}$

36. $\log_5 x = \frac{\ln x}{\ln 5}$

$y = \frac{1}{\ln 5} \cdot \ln x \quad y' = \frac{1}{\ln 5} \cdot \frac{1}{x}$

28. $y = \frac{1+\ln x}{2x^2}$ (f': $\frac{1}{x}$; g: $2x^2$; g': $4x$; f: $1+\ln x$)

$y' = \frac{\frac{1}{x} \cdot x^2 - 2x \cdot (1+\ln x)}{(x^2)^2}$ (g^2)

$= \frac{x - 2x(1+\ln x)}{x^4}$

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

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