SOLUTIONS CHAPTER 13.1

MATH 132 WI01

8.

$$y' = \frac{1}{-x^2 + 6x} \cdot (-2x + 6)$$

14. Product rule + chain rule:

$$[2(2x+5) \cdot 2] \cdot \ln(2x+5) + (2x+5)^2 \cdot [\frac{1}{2x+5} \cdot 2]$$

18. Use the fact that

$$\log_4(x) = \frac{\ln(x)}{\ln(4)}$$

and rewrite the function:

$$y = x^3 \log_4(x) = x^3 \frac{\ln(x)}{\ln(4)} = \frac{1}{\ln(4)} \cdot x^3 \ln(x)$$

(where, of course, $\ln(4)$ **is a constant**, right?). Hence

$$y' = \frac{1}{\ln(4)}(3x^2 \ln(x) + x^3 \frac{1}{x})$$

40. What we have here is a power which is **not inside** the ln, but outside (formally: applied to ln), so we have to use chain rule first of all:

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

42. Use ln's properties -

$$\ln(x^2 \cdot \sqrt{3x-2}) = \ln(x^2) + \ln(\sqrt{3x-2}),$$

$$\ln(x^2) = 2\ln(x)$$

and

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

Rewrite the function:

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

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and so

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