Calculus II Homework (Pg. 207)

Pg. 207-209

9. Compute dy/dx using the limit definition.

$y = 4 - x^2$

$$\lim_{h\to 0} \frac{f(x+h)-f(x)}{h} \rightarrow \lim_{h\to 0} \frac{(4-(x+h)^2)-(4-x^2)}{h} \rightarrow \lim_{h\to 0} \frac{4-x^2-2xh-h^2-4+x^2}{h}$$

$$\lim_{h\to 0} \frac{h(-2x-h)}{h} \rightarrow \lim_{h\to 0} -2x-0 \rightarrow \boxed{\frac{dy}{dx} = -2x}$$

29. Compute the derivative. (POWER RULE)

$y = 4x^{-3/2+1}$ $(y' = b \cdot x^{b-1})$

$y' = 4 \cdot -\frac{3}{2} \cdot x^{-5/2} = \boxed{y' = -6x^{-5/2}}$ ✓

33. $y = \frac{3t-2}{4t-9}$ → Compute derivative. (QUOTIENT RULE)

$$y' = \frac{f'g - fg'}{g^2} \rightarrow y' = \frac{3(4t-9) - 4(3t-2)}{(4t-9)^2} \rightarrow y' = \frac{12t-27-12t+8}{(4t-9)^2}$$

$$\boxed{y' = \frac{-19}{(4t-9)^2}}$$

35. Compute derivative. (CHAIN RULE)

$y = (3t^2 + 20t^{-3})^6$

$\boxed{y' = 6(3t^2+20t^{-3})^5 \cdot (6t - 60t^{-4})}$ ✓

* 41. Compute derivative. (CHAIN + PRODUCT RULES)

$y = ((1-x)(\sqrt{2-x}))^{-1}$

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

$$\boxed{y' = \frac{-1}{((1-x)(\sqrt{2-x}))^2} \cdot \left(-\sqrt{2-x} + \frac{1-x}{2\sqrt{2-x}}\right)}$$

Calculus II Homework (cont.)

51. $y = \tan(\cos(x))$ Compute derivative. (CHAIN RULE.)

$\boxed{y' = \sec^2(\cos x) \cdot -\sin(x)}$ ✓

57. $f(x) = \ln(x + e^x)$ Find the derivative. $\left(\frac{d}{dx}\ln(f(x)) = \frac{f'(x)}{f(x)}\right)$

$$\boxed{f'(x) = \frac{1 + e^x}{(x + e^x)}}$$

69. $G(s) = \tan^{-1}(s^{1/2})$ Find the derivative, (CHAIN RULE!)

$$\boxed{G'(s) = \left(\frac{1}{s+1}\right) \cdot \frac{1}{2} s^{-1/2} \quad \underline{OR} \quad \frac{1}{(s+1)(2s^{1/2})}}$$