Mr. Konichek
Hmwk 3.5

3.5 Pg. 218 (1, 3, 5, 7, 9, 15, 21, 22, 29)

1. $f(x) = 4x^2 - 2x + 1$

$f'(x) = 8x - 2$

$f''(x) = 8$

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

$f'(x) = 6x^2 - 6x = 6(x^2 - 1)$

$f''(x) = 12x - 6 = 6(2x - 1)$

5. $h(t) = t^4 - 2t^3 + 6t^2 - 3t + 10$

$h'(t) = 4t^3 - 6t^2 + 12t - 3$

$h''(t) = 12t^2 - 12t + 12 = 12(t^2 - t + 1)$

7. $f(x) = (x^2 + 2)^5$

$f'(x) = 5(x^2 + 2)^4 (2x)$

$= (10x)(x^2 + 2)^4$

$f''(x) = (x^2 + 2)^4 (10) + (10x)(4)(x^2 + 2)^3 (2x)$

$= 10(x^2 + 2)^4 + 80x^2 (x^2 + 2)^3$

$= (x^2 + 2)^3 (10(x^2 + 2) + 80x^2)$

$10x^2 + 20 + 80x^2$

$= (x^2 + 2)^3 (90x^2 + 20)$

$f''(x) = 10(x^2 + 2)^3 (9x^2 + 2)$

9. $g(t) = (2t^2 - 1)^2 (3t^2)$

$g'(t) = (3t^2)(2)(2t^2 - 1)(4t) + (2t^2 - 1)^2 (6t)$

$= 24t^3 (2t^2 - 1) + (6t)(2t^2 - 1)^2$

$= (2t^2 - 1)(24t^3 + 6t(2t^2 - 1))$

$12t^3 - 6t$

$(36t^3 - 6t)$

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Hmwk 3.5 cont.

3.5 Pg 218 (9 cont., 15, 21, 22, 29)

9. from page 1 $g'(t) = (2t^2-1)(36t^3-6t)$

$$g''(t) = (36t^3-6t)(4t) + (2t^2-1)(108t^2-6)$$
$$= 144t^4 - 24t^2 + 216t^4 - 12t^2 - 108t^2 + 6$$
$$= 360t^4 - 144t^2 + 6$$
$$= 6(60t^4 - 24t^2 + 1)$$

15. $f(x) = \frac{x}{2x+1}$

$$f'(x) = \frac{(2x+1)(1) - (x)(2)}{(2x+1)^2} \quad (2x+1 \text{ and } -2x \text{ cancel}) = (2x+1)^{-2}$$

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

21. $f(x) = 3x^4 - 4x^3$
$f'(x) = 12x^3 - 12x^2$
$f''(x) = 36x^2 - 24x$
$f'''(x) = 72x - 24$

22. $f(x) = 3x^5 - 6x^4 + 2x^2 - 8x + 12$
$f'(x) = 15x^4 - 24x^3 + 4x - 8$
$f''(x) = 60x^3 - 72x^2 + 4$
$f'''(x) = 180x^2 - 144x = 36x(5x-4)$

29. $s = 16t^2$; $256 = 16t^2$; $t^2 = 16$; $t = 4$
$s' = 32t$ $s'(4) = 32(4) =$ 128 ft/s

$s'' = 32$ ft/s^2