SOLUTIONS CHAPTER 12.5

MATH 132 WI01

6.

Proof.

$$C'(I) = (2I^2 - 3)' \cdot (3I^2 - 4I + 1) + (2I^2 - 3) \cdot (3I^2 - 4I + 1)' =$$
$$= (4I)(3I^2 - 4I + 1) + (2I^2 - 3)(6I - 4)$$

□

10.

Proof.

$$y' = (2 - 3x + 4x^2)' \cdot (1 + 2x - 3x^2) + (2 - 3x + 4x^2) \cdot (1 + 2x - 3x^2)' =$$
$$= (-3 + 8x)(1 + 2x - 3x^2) + (2 - 3x + 4x^2)(2 - 6x)$$

□

24.

Proof.

$$f(x) = \frac{5(x^2 - 2)}{7} = \frac{5}{7}(x^2 - 2)$$

so then

$$f'(x) = \frac{5}{7}(x^2 - 2)' = \frac{5}{7}(2x)$$

□

28.

Proof.

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

□

Date: 01/21/2000.

36.

Proof.

$$y = \frac{x-5}{2\sqrt{x}} = \frac{x}{2\sqrt{x}} - \frac{5}{2\sqrt{x}} = \frac{1}{2}\sqrt{x} - \frac{5}{2}\frac{1}{\sqrt{x}} =$$
$$= \frac{1}{2}x^{\frac{1}{2}} - \frac{5}{2}x^{-\frac{1}{2}}$$

so then

$$y' = \frac{1}{2}\cdot\frac{1}{2}x^{\frac{1}{2}-1} - \frac{5}{2}\cdot(-\frac{1}{2})x^{-\frac{1}{2}-1} =$$
$$= \frac{1}{4}x^{-\frac{1}{2}} + \frac{5}{4}x^{-\frac{3}{2}}$$

□

50.

Proof. First compute the derivative of y:

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

Plug in $x = 1$; we get:

$$\text{slope of tangent line} = \frac{3\cdot 1^2\cdot(1^4+1) - 1^3\cdot(4\cdot 1^3)}{(1^4+1)^2} =$$
$$= \frac{3\cdot 2 - 4}{2^2} = \frac{6-4}{4} = \frac{2}{4} = 0.5$$

Based on **point-slope formula** we get, for the point $(1, \frac{1}{2})$ and slope 0.5:

$$y - \frac{1}{2} = 0.5\cdot(x-1)$$

□