Calculus AB

2-3

(Day 1)

Product and Quotient Rules

Product Rule - If $h(x) = f(x) \cdot g(x)$, then

$$h'(x) = f'(x) \cdot g(x) + g'(x) \cdot f(x)$$

Use the product rule to differentiate the function. (pg 124)

1) $g(x) = (x^2 + 1)(x^2 - 2x)$

$g'(x) = 2x(x^2-2x) + (2x-2)(x^2+1)$

$g'(x) = 2x^3 - 4x^2 + 2x^3 - 2x^2 + 2x - 2$

$= 4x^3 - 6x^2 + 2x - 2$

5) $f(x) = x^3 \cos x$

$F'(x) = 3x^2 \cos x + (-\sin x)\, x^3$

$= 3x^2 \cos x - x^3 \sin x$

Quotient Rule - If $h(x) = \dfrac{f(x)}{g(x)}$, then

$$h'(x) = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{g^2(x)}, \quad g(x) \neq 0$$

Use the quotient rule to differentiate the function.

7) $f(x) = \dfrac{x}{x^2 + 1}$

$F'(x) = \dfrac{(1)(x^2+1) - 2x(x)}{(x^2+1)^2}$

$= \dfrac{x^2+1-2x^2}{(x^2+1)^2} = \dfrac{1-x^2}{(x^2+1)^2}$

11) $g(x) = \dfrac{\sin x}{x^2}$

$g'(x) = \dfrac{x^2 \cos x - 2x \sin x}{x^4}$

$= \dfrac{x\cos x - 2\sin x}{x^3}$

Assignment:

Pg 125
1-11 odd