Ch 2.2 Basic Rules of Differentiation

Problems # 3-31,37, 45,53-59, 63, 87-93

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Homework Part 1

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G: f(x) = 3 F: f ' (x)

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{3-3}{\Delta x} = \lim_{\Delta x \to 0} \frac{0}{\Delta x} = 0$$

G: f(x) = 5 F: f ' (x) ? 0

Does it matter if f(x) = -9? or f(x) = k?

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G: $f(x) = 3 - 5x$ $f(\ ) = 3 - 5(\ )$ F: $f'(x)$

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{[3 - 5(x+\Delta x)] - [3 - 5x]}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{3 - 5x - 5\Delta x - 3 + 5x}{\Delta x} = \lim_{\Delta x \to 0} \frac{-5\Delta x}{\Delta x} = \lim_{\Delta x \to 0} (-5)$$

$$= -5$$

What if $f(x) = 3 + 2x$?

$f'(x) = 2$

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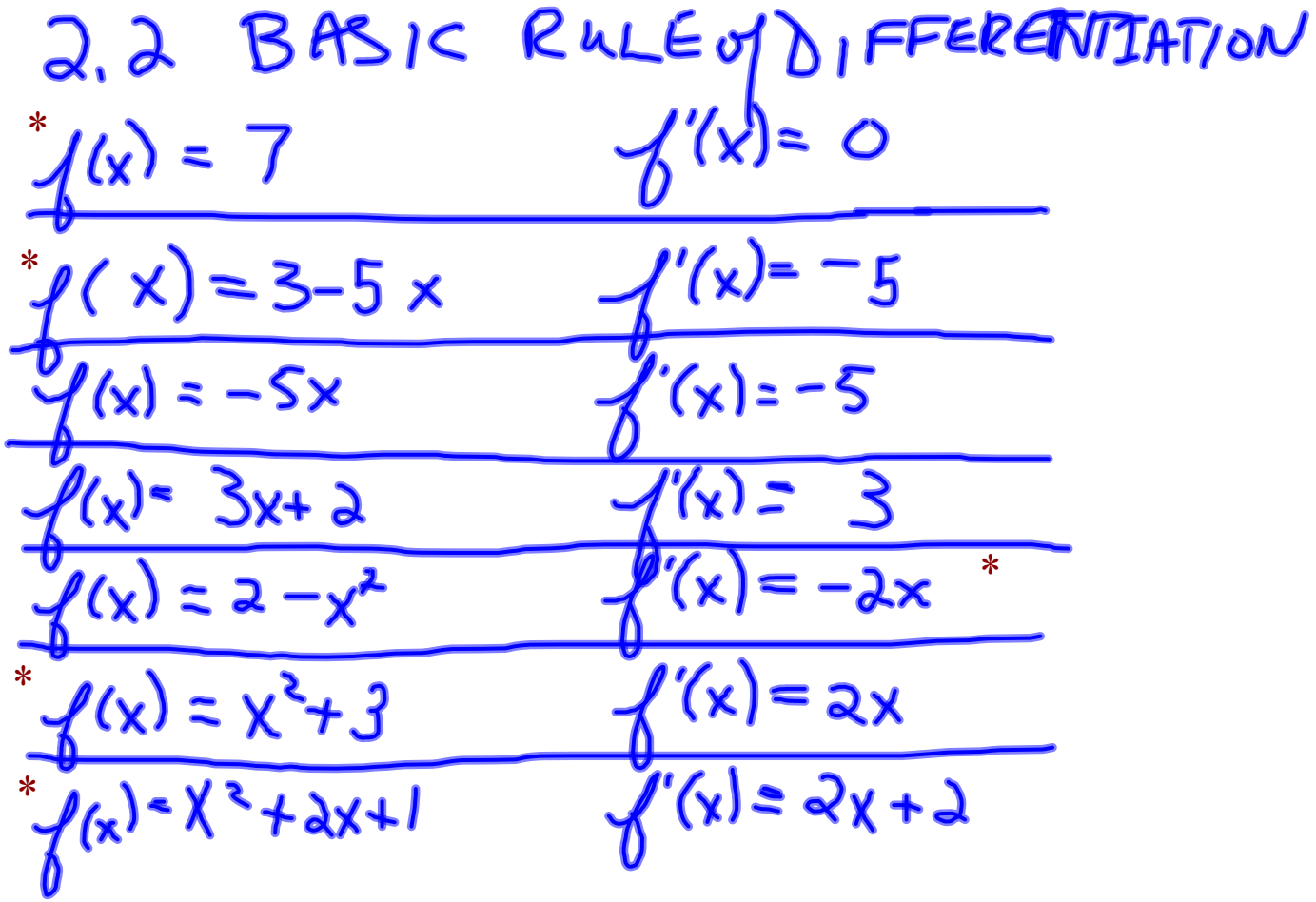

Can you see any patterns in finding the derivative?

*These problems are from your homework or class.

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2.2 BASIC RULES of DIFFERENTIATION

Find the derivatives: What were they again?

$f(x) = 7$ $f'(x) =$

$f(x) = 3 - 5x$ $f'(x) =$

$f(x) = -5x$ $f'(x) =$

$f(x) = 3x + 2$ $f'(x) =$

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

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

$f(x) = x^2 + 2x + 1$ $f'(x) =$

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geogebra Derivative Practice

Rules of Differentiation

1. The Constant Rule $\frac{d[c]}{dx} = 0$

2. The Power Rule $\frac{d[x^n]}{dx} = nx^{n-1}$

3. The Constant Multiple Rule $\frac{d[cf(x)]}{dx} = cf'(x)$

4. Sum & Diff Rule: $\frac{d[f(x) \pm g(x)]}{dx} = f'(x) \pm g'(x)$

5. $\frac{d[\sin x]}{dx} = \cos x$ $\frac{d[\cos x]}{dx} = -\sin x$

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Homework Part 1

Ch 2.2 Basic Rules of Differentiation

Click icon to open geogebra Derivative Practice.
Use to check answers

$f(x) = -2 \quad f'(x) =$

$y = x^8 \quad \frac{dy}{dx} =$

$y = \frac{1}{x^8} = x^{-8} \quad \frac{dy}{dx} =$

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

$f'(x) =$

$y = 5 + \sin x \quad \frac{dy}{dx} =$

$\frac{d[x^n]}{dx} = nx^{n-1}$

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Homework Part 1

Click icon to open geogebra Derivative Practice.
Use to check answers

$f(x) = -2 \quad f'(x) = 0$

$y = x^8 \quad \frac{dy}{dx} = 8x^7$

$\frac{d[x^n]}{dx} = nx^{n-1}$

$y = \frac{1}{x^8} = x^{-8} \quad \frac{dy}{dx} = -8x^{-9} = \frac{-8}{x^9}$

$-8-1=-9$

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

$f'(x) = 2(3x^2) - 2x + 3 = 6x^2 - 2x + 3$

$y = 5 + \sin x \quad \frac{dy}{dx} = \cos x$

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Click icon to open geogebra Derivative Practice.
Use to check answers

$y = \frac{2}{3x^2} =$

$\frac{dy}{dx} =$

$y = \frac{11}{(3x)^2} =$

$F: \frac{dy}{dx}$

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$$y = \frac{2}{3x^2} = \frac{2}{3}x^{-2}$$

$$\frac{dy}{dx} = \frac{2}{3}\cdot(-2x^{-3}) = \boxed{\frac{-4}{3x^3}}$$

$$= -\frac{4}{3}x^{-3}$$

$$y = \frac{11}{(3x)^2} = \frac{11}{9x^2} \qquad F: \frac{dy}{dx}$$

$$y = \frac{11}{9}x^{-2}$$

$$\frac{dy}{dx} = \frac{11}{9}\left[-2x^{-3}\right] = \boxed{\frac{-22}{9x^3}}$$

$y = 3x^3 - 6$ F: m of graph at $(2, 18)$

34. $y = 3x^3 - 6$ F: m of graph at $(2, 18)$

$$\frac{dy}{dx} = 3(3x^2) + 0 = 9x^2$$

$$\left.\frac{dy}{dx}\right|_{(2,18)} = 9(2)^2 = 9(4) = 36$$

$y - y_1 = m_T(x - x_1)$

$y - 18 = m_T(x - 2)$

$y - 18 = 36(x - 2)$