

Math 16A: Short Calculus I
 Fall 2017, Section 3
 Homework Sheet 4
 Due: Wednesday, October 25, 2017

Submit your solutions to the following problems in lecture on the due date above. Present your work in a clean and organized fashion, either on a printed copy of this document (preferred) or a separate sheet of paper. As stated in the syllabus, late submissions will **not** be accepted.

1. Compute the following derivatives using the derivative rules.

$$(a) \frac{d}{dx}(x^5 + 2x^3 + 5x + 3) = \frac{d}{dx}(x^5) + \frac{d}{dx}(2x^3) + \frac{d}{dx}(5x) + \frac{d}{dx}(3)$$

$$= \boxed{5x^4 + 6x^2 + 5} + 0$$

$$(b) \frac{d}{dx}[(x^2 + 2x + 3)(5x^3 + 2x + 3)] = (2x + 2)(5x^3 + 2x + 3) + (x^2 + 2x + 3)(15x^2 + 2)$$

$$(c) \frac{d}{dx} \left(\frac{x^2 + 2x + 3}{5x^3 + 2x + 3} \right) = \frac{(2x + 2)(5x^3 + 2x + 3) - (x^2 + 2x + 3)(15x^2 + 2)}{(5x^3 + 2x + 3)^2}$$

$$(d) \frac{d}{dx}(x^3 + 2x + 1)^8 = 8(x^3 + 2x + 1)^7 (3x^2 + 2)$$

$$(e) \frac{d}{dx} \sqrt{x^3 + 5x + 3} = \frac{d}{dx} (x^3 + 5x + 3)^{1/2} = \frac{1}{2} (x^3 + 5x + 3)^{-1/2} (3x^2 + 5)$$

2. Find the equation for the tangent line to $f(x) = (2x - 3)^5$ at $x = 1$.

$$f'(x) = 5(2x - 3)^4 \cdot (2)$$

$$= 10(2x - 3)^4$$

$$m = f'(1) = 10(-1)^4 = 10$$

$$x_0 = 1, y_0 = f(1) = (-1)^5 = -1$$

$$y - (-1) = 10(x - 1)$$

$$\boxed{y = 10x - 11}$$