Math 16B: Short Calculus II  
Spring 2017, Section 1  
Homework Sheet 3  
Due: Wednesday, April 26, 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. Evaluate the following indefinite integrals.

   (a) \[ \int 4(3x + 2)^6 \, dx = \frac{4}{3 \cdot 7} (3x + 2)^7 + C \]
   
   Check: \[ \frac{d}{dx} \left( \frac{4}{3 \cdot 7} (3x + 2)^7 \right) = \frac{4}{3 \cdot 7} \cdot 7 (3x + 2)^6 \cdot 3 = 4(3x + 2)^6 \checkmark \]

   (b) \[ \int 4xe^{9x^2} \, dx = \frac{4}{18} e^{9x^2} + C \]
   
   Check: \[ \frac{d}{dx} \left( \frac{4}{18} e^{9x^2} \right) = \frac{4}{18} e^{9x^2}, \quad 18x = 4xe^{9x^2} \checkmark \]

2. Solve the following initial value problem.

   \[ f''(x) = 2x + 3, \quad f'(1) = 5, \quad f(0) = 3 \]

   \[ f'(x) = X^2 + 3X + 1 \]

   \[ \int (X^2 + 3X + 1) \, dx = \frac{1}{3} X^3 + \frac{3}{2} X^2 + X + C \]

   \[ f(x) = \frac{1}{3} X^3 + \frac{3}{2} X^2 + X + C \]

   \[ f(0) = \frac{1}{3} (0)^3 + \frac{3}{2} (0)^2 + 0 + C \]

   \[ C = 3 \]

3. Suppose a ball is thrown upward at 48ft/s starting from 15ft above ground. What is the largest height the ball will achieve?

   \[ q(t) = -32 \text{ ft/sec}^2 \]

   \[ v(t) = -32t + C \]

   \[ y(t) = -32t + C \]

   \[ C = 48 \]

   \[ v(t) = -32t + 48 \]

   \[ h(t) = -16t^2 + 48t + C \]

   \[ 15 = -16(0)^2 + 48(0) + C \]

   \[ C = 15 \]

   \[ h(t) = -16t^2 + 48t + 15 \]

   \[ h(\frac{3}{2}) = -16(\frac{3}{2})^2 + 48(\frac{3}{2}) + 15 \]

   \[ h(t) \geq 0 \]

   \[ v(t) = -32t + 48 = 0 \]

   \[ t = \frac{3}{2} \]

   \[ h(\frac{3}{2}) = -16(\frac{3}{2})^2 + 48(\frac{3}{2}) + 15 \]