

**Mat 115 Worksheet 6**  
**Thursday, Oct 19 2017**

Name:

**Important info:** Welcome to the mat 115 workshops! My name is **Diego Avalos** (avalosgalvez@cpp.edu), and I will be your workshop facilitator. We meet on Tuesdays and Thursdays from 4 to 5:50 pm. My office hour is on Mondays from 11:30 am to 12:30 pm in room 94-219. All worksheets and solutions may be found at the website [www.diegoavalos.net/teaching/mat115workshop2017](http://www.diegoavalos.net/teaching/mat115workshop2017).

1. Compute the following indefinite integrals.

(a)  $\int (2x + 1)^2 dx$

(d)  $\int \sec 2x \tan 2x dx$

(g)  $\int \sqrt[4]{x^3} + \sqrt{x^5} dx$

(b)  $\int \frac{1}{x^2} - \frac{2}{x^{5/2}} dx$

(e)  $\int \frac{12}{x} dx$

(h)  $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$

(c)  $\int 1 + \cos 3x dx$

(f)  $\int \frac{1}{x^2 + 1} dx$

2. Find the function with the following properties

(a)  $f'(t) = \sin t + 2t$ , and  $f(0) = 5$

(b)  $h'(x) = \sin^2 x$ , and  $h(1) = 1$

3. Evaluate  $\int_0^4 \sqrt{8x - x^2} dx$ .

4. Evaluate the following definite integrals

(a)  $\int_{-2}^2 3x^4 - 2x + 1 dx$

(d)  $\int_0^1 \frac{1}{\sqrt{4 - x^2}} dx$

(g)  $\int_2^3 \frac{x^2 + 2x - 2}{x^3 + 3x^2 - 6x} dx$

(b)  $\int_0^2 (x + 1)^3 dx$

(e)  $\int_0^3 \frac{x}{\sqrt{25 - x^2}} dx$

(h)  $\int_0^{1-e^{-2}} \frac{\ln(1-x)}{1-x} dx$

(c)  $\int_0^1 \sqrt{x}(\sqrt{x} + 1) dx$

(f)  $\int_0^\pi \sin^2 5x dx$

5. Assume  $f'$  is continuous on  $[2, 4]$ ,  $\int_1^2 f'(2x) dx = 10$ , and  $f(2) = 4$ . Evaluate  $f(4)$ .

6. Compute  $f'(x)$  for each of the following functions

(a)  $f(x) = \int_0^x (1 + t^2)^{-3} dt$

(b)  $f(x) = \int_0^{x^2} (1 + t^2)^{-3} dt$

(c)  $f(x) = \int_{x^3}^{x^2} (1 + t^2)^{-3} dt$

7. The acceleration of an object moving along a line is given by  $a(t) = 2 \sin\left(\frac{\pi t}{4}\right)$ . The initial velocity and position are  $v(0) = -8/\pi$  and  $s(0) = 0$ . (a) Find the velocity and position for  $t \geq 0$ . (b) What are the minimum and maximum values of  $s(t)$ ? (c) Find the average velocity and average position over the interval  $[0, 8]$ .

8. Find the area of the region bounded by  $y = x^2$ ,  $y = 2x^2 - 4x$ , and  $y = 0$ .

9. Find the area of the region in the first quadrant bounded by  $y = x/6$  and  $y = 1 - |x/2 - 1|$ .