

# Mathematic 108, Fall 2015: Assignment #9

Due: **In your assigned section, either Tues., Nov. 17th or Thurs., Nov. 19th**

*Instructions:* Please ensure your name, your TA's name and your section number appear on the first page. Also that your answers are legible and all pages are stapled. Page numbers refer to the course text.

**Problem #1.** Express the following limits as definite integrals.

- a)  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{i=1}^n 2^{i/n}$ .
- b)  $\lim_{n \rightarrow \infty} \sum_{i=-n}^{n-1} \frac{i^5}{n^6}$ .

**Problem #2.** Suppose,  $\int_0^1 f(y)dy = -2$ ,  $\int_0^2 f(t)dt = -3$  and  $\int_1^3 f(x)dx = 0$ . Compute  $\int_2^3 f(x)dx$ .

**Problem #3.** Suppose that  $|f(x)| \leq 2|x|$ . Determine the largest and smallest possible values for  $\int_1^3 f(x)dx$ .

**Problem #4.** Suppose that the graph of  $f$  is concave up on  $(-2, 2)$ ,  $f(0) = 2$  and  $f'(0) = 2$ . Determine the smallest possible value of  $\int_{-1}^1 f(t)dt$ .

**Problem #5.** Let  $f(x) = \begin{cases} -2x & x \leq 2 \\ 3 & x > 2. \end{cases}$  Compute  $F(x) = \int_0^x f(t)dt$ .

**Problem #6.** Evaluate the following definite integrals.

- a)  $\int_{-1}^1 x^{25}dx$
- b)  $\int_0^1 \frac{2}{1+x^2} dx$
- c)  $\int_1^2 t + t^{-1} dt$ .

**Problem #7.** If  $F(x) = \int_x^{x^2} \cos(t^2)dt$  compute  $F'(x)$ .

**Problem #8.** Compute  $\int_{-\pi}^{\pi} |\sin(x)|dx$ .

**Problem #9.** Compute  $\lim_{x \rightarrow 0} \frac{\int_0^x e^{-t^2} dt}{\ln(2x+1)}$ .

**Problem #10.** If  $f(3) = 3$ ,  $f'$  is continuous and  $\int_{-1}^3 f'(t)dt = 12$ , then compute  $f(-1)$ .

**Book Problems.**

- a) Section 5.1: #2, #24
- b) Section 5.2: #18, #34, #40, #56
- c) Section 5.3: #14, #34, #48, #64