

## Math 151, Fall 2016, Additional Review Problems

**Your final exam is cumulative. Consequently, you should also study the review problems for the two midterm exams.** Some of the review problems that you see below deal with topics that were covered after the second midterm exam. Other problems on this sheet deal with topics from before the second midterm exam. Some of these problems may resemble actual questions on your final exam. Some of these problems do not resemble any questions on your final exam.

(1) A continuous function  $f(x)$  on the interval  $[1, 10]$  has the properties

$$\int_1^8 f(x) dx = 14, \quad \int_4^{10} f(x) dx = 7, \quad \int_1^{10} f(x) dx = 2.$$

Find  $\int_4^8 f(x) dx$ .

(2) Evaluate  $\frac{d}{dx} \int_{x^3}^0 e^{t^2} dt$ .

(3) Use L'Hôpital's Rule to show  $\lim_{x \rightarrow \infty} \left(1 + \frac{3}{x}\right)^x = e^3$ .

(4) A bacterial population quadruples in size every 7 days. How many days does it take for this population to triple in size?

(5) Evaluate  $\int \frac{x^3 dx}{\sqrt{1-x^8}}$ .

(6) Evaluate  $\int \frac{x^3 dx}{1+x^8}$ .

(7) Let  $f(x)$  be defined for  $x > 0$  by  $f(x) = x^2 \ln x$ . Find the intervals where  $f(x)$  is concave up and the intervals where  $f(x)$  is concave down.

(8) Evaluate  $\int_{-2}^5 |x-1| dx$ .

(9) Find the points on the curve  $x = 2y^2$  which are closest to the point  $(10, 0)$  in the  $xy$ -plane.

(10) Find the second derivative of  $f(x) = \sin^{-1} x$ .

(11) Find the area of the region bounded by  $x = y^2$  and  $x = y + 2$ .

(12) Find  $\sum_{i=1000}^{2000} i$ .