

**MATH 16B:  
FAKE TEST 2B**

SPRING 2007

- (1) a) Find the area of the region bounded by the  $y$ -axis and the graph of the function  $f(y) = y^3 - 5y^2 + 6y$  on the interval  $[0, 3]$ .  
b) Determine the average value of the function  $f$  described above on  $[0, 3]$ .  
c) Write a sentence comparing the differences in integrals you used to calculate a) and b).

- (2) Suppose that  $f$  is an odd function and  $g$  is an even function.  
a) If the average value of  $f$  on  $[0, 5]$  is 10, calculate

$$\int_{-5}^0 f(x)dx.$$

- b) If the average value of  $g$  on  $[-3, 3]$  is 9, calculate

$$\int_0^3 g(x)dx.$$

- (3) a) Sketch the region bounded by the curves  $y = 3x$  and  $y = 2\sqrt{x}$ .  
b) Calculate the volume obtained by revolving the region found in part a) about the  $x$ -axis.  
c) Calculate the volume obtained by revolving the region found in part a) about the  $y$ -axis.

- (4) Set up an integral which calculates the volume of a football. Suppose the football is the result of revolving (a portion of ) the ellipse

$$\frac{x^2}{9} + \frac{y^2}{4} = 1$$

about the  $x$ -axis.

- (5) A professor finds that the probability that students enjoy the class depends on the amount of information they understand. Explicitly, he determines that a student who understands between  $a$  and  $b$

percent of the course has a probability, given by

$$\mathbb{P}(a \leq x \leq b) = \frac{1}{4} \int_a^b \frac{1}{1 + \sqrt{x}} dx$$

of enjoying the experience of learning. Based on the above model, if a student only understands half of the material presented in the course, what is the probability that he/she enjoyed the class?

(6) Integrate

$$\int x^2 \sqrt[5]{3x-1} dx$$

(7) Integrate

$$\int x (\sec^2(2x) - e^{3x}) dx.$$

(8) Integrate

$$\int \sec(3x) + \frac{\sin(2x)}{3 + \cos(2x)} dx.$$