

## MA2 Exam 5 Review Sheet

Exam 5 will be given on Wednesday, May 27, 2009. *Calculators are not permitted on this exam.*  
This exam will focus on the following topics:

- Finding the area under a curve using The Fundamental Theorem of Calculus.
- Approximating the area under a curve using inscribed or circumscribed rectangles.
- Left endpoint, right endpoint, and midpoint approximations.
- Using formulas from geometry to compute definite integrals  
(e. g.  $\int_{-3}^3 \sqrt{9-x^2} dx$  is the area of a semicircle of radius 3).
- The concept of *net area*.
- Properties of the definite integral.
- Integrals of split functions, including absolute-value functions.
- Finding the area between curves by integrating with respect to  $x$ .

1. If the definite integral  $\int_a^b f(x)dx$  represents the area of the region bounded by  $y = f(x)$ , the  $x$ -axis, and the lines  $x = a$  and  $x = b$ , which of the following must be true?  
(A)  $a > b$  and  $f(x) > 0$                       (B)  $a > b$  and  $f(x) < 0$                       (C)  $a < b$  and  $f(x) > 0$   
(D)  $a < b$  and  $f(x) < 0$                       (E) None of the above
2. If  $\int_0^4 (x^2 - 6x + 9) dx$  is approximated by 4 inscribed rectangles of equal width on the  $x$ -axis, then the approximation is  
(A) 14                      (B) 10                      (C) 6                      (D) 5                      (E) 4
3. Suppose that  $f(x)$  is an even function and let  $\int_0^1 f(x)dx = 5$  and  $\int_0^7 f(x)dx = 1$ . What is  $\int_{-1}^{-7} f(x)dx$ ?  
(A) -5                      (B) -4                      (C) 0                      (D) 4                      (E) 5
4. Find the area of the region between the graph of  $y = 3x^2 + 2x$  and the  $x$ -axis from  $x = -\frac{1}{2}$  to  $x = 3$ .
5. Find the midpoint approximation of  $\int_{-9}^{-1} \frac{1}{x} dx$  using  $n = 4$  rectangles.
6. Evaluate the integral:  $\int_0^3 |x - 1| dx$ .
7. If  $f(x) = \begin{cases} e^{2x} & \text{if } x > 0 \\ -x^2 + 1 & \text{if } x \leq 0 \end{cases}$ , evaluate  $\int_{-1}^1 f(x) dx$ .
8. Sketch the region bounded by the curves  $y = x^3$  and  $y = x$  and find its area.
9. Find the area between the curves  $y = x^2 + 2$  and  $y = 2x + 5$  from  $x = 0$  to  $x = 6$ .