

**EXAM 3**  
Math 106  
December 4, 2008

Name \_\_\_\_\_

You must show all your work. Partial credit will be given.

1. Use the right-hand sum to estimate the area between the graph of  $f(x) = x^2 - 2$  and the horizontal axes on the interval  $[2, 4]$ . Use  $n = 10$  rectangles. (8 pts)

2. Based on data from November 22 to 24, 2002, the flow rate of the Snake River near Irwin, Idaho, at noon may be modeled by

$$f(t) = -50t^2 + 100t + 1050$$

cubic feet per second, where  $t$  is the number of 24-hour periods since noon on November 22, 2002. How much water (in gallons) past by this point near Irwin, Idaho between noon on November 22, 2002 and noon on November 24, 2002? Use a left-hand sum and  $n = 12$  to approximate this quantity of water. (8 pts)

3. Find each of the following quantities: (8 pts each)

(a)  $\int 3t^{-3} - 4t^3 + 2 dt$

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

(c)  $\int \frac{4x^3 - 15}{x^2} dx$

(d)  $\int 2(3^x) - 3x^2 dx$

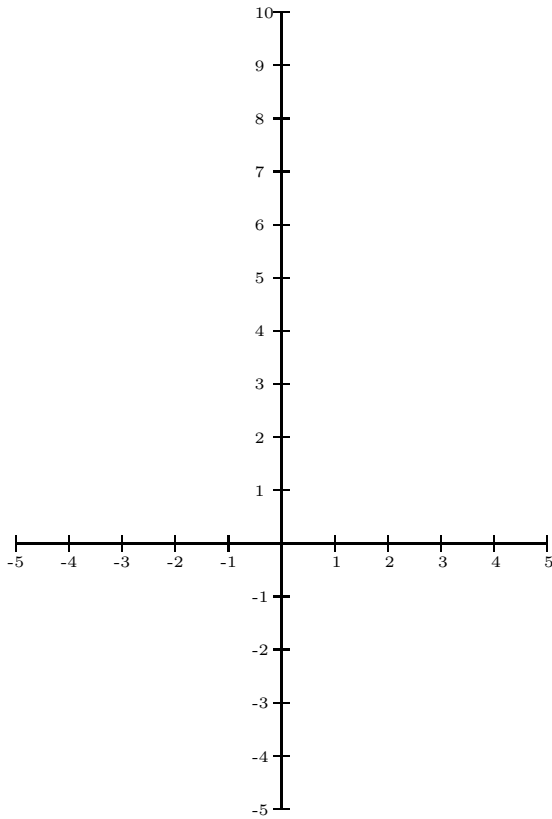
$$(e) \int \left( \frac{4}{x} - \frac{5}{x^2} \right) dx$$

$$(f) \int_2^3 2^t dt$$

$$(g) \int_0^2 (x^3 - 1)(x^4 - 4x)^3 dx$$

$$(h) \int_0^1 \left( \frac{2x}{x^2 + 1} \right) dx$$

4. On the axes below, sketch in the area represented by  $\int_2^4 9 - x^2 dx$ . (8 pts)



5. Using the graph below, write the definite integral that corresponds to the shaded area. If possible, find the area geometrically. The equation of the graph is  $f(x) = -|x - 2| + 3$ . (8 pts)

