

## MAT 170 Section 005

November 30, 2005

Names \_\_\_\_\_

**Please work in groups with no more than four people and complete this worksheet during class. Hand in one worksheet for each group.**

1. Find the antiderivative of the following:

(a)  $f'(x) = \frac{2}{1+x^2}$ .

(b)  $f'(x) = \frac{x^2+1}{x^2}$ .

2. With what initial velocity must an object be projected upward from the ground to reach a maximum height of 168 meters?

3. True or False: If  $\int_a^b f(x)dx = 0$ , then  $f(x) = 0$  on  $[a, b]$ . If true, prove it. If false, given an example where it is not true.

4. Write down the limit definition of the definite integral  $\int_1^3 \frac{1}{x^2} dx$  using Riemann sums. In addition, assume the intervals are equally spaced and use the left-hand endpoints of the interval as the height of the rectangles to come up with an expression for  $f(x_i)$ . Insert this, and the value of  $\Delta x$  into the Riemann sum.

5. Write the limit below as a definite integral. Be sure to give the lower limit, upper limit, and integrand explicitly.

*Hint: Do 4). first. You need to determine  $\Delta x$  and  $x_i$  before you can come up with  $f(x)$ .*

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \left( \frac{2\pi^2}{n} \left( 1 + \frac{i}{n} \right) + \frac{\pi}{2n} \cos \left( \pi + \frac{\pi i}{n} \right) \right)$$

6. Evaluate the limit

$$\lim_{n \rightarrow \infty} \left( \frac{1^2}{n^3} + \frac{2^2}{n^3} + \dots + \frac{n^2}{n^3} \right)$$

by relating it to a definite integral which you know how to compute.

*Hint: first find  $\Delta x$  and  $x_i$ , then determine  $f(x)$ ,  $b$ , and  $a$ .*

7. Evaluate  $\int_0^1 \frac{2t^3 + t^2 + t + 2}{t + 1} dt$ .

8. Evaluate  $\int \frac{\cos \sqrt{x}}{2\sqrt{x}} dx$ .

9. Evaluate  $\int (x + \sec^2 \pi x) dx$ .

10. Evaluate  $\int t^4 \sqrt[3]{3 - 5t^5} dt$ .