

Math 106
Calculus 2
Winter 2009
Exam 1
Balcomb

1. The graph of a function, $f(x)$, is increasing and concave down on the interval $[a,b]$. Put the following quantities in increasing order: L_{100} , R_{100} , T_{100} , M_{100} ,

$$\int_a^b f(x)dx .$$

2. Let $I = \int_1^2 x^3 dx$.

- a) Use the Fundamental Theorem of Calculus to evaluate I exactly.

- b) Write out and add up the four terms in the approximating sums

$$L_4 =$$

$$R_4 =$$

3. Evaluate. [Your final answer should not contain any integrals]:

a) $\int x\sqrt{4-9x^2} dx$

b) $\int \frac{\sec^2(x)}{\sqrt{\tan(x)}} dx$

4. Evaluate $\int_0^{\pi/2} x \cos(x^2) dx$

5. Use Euler's method with four steps on the differential equation $y' = y + t$ to estimate $y(2.0)$ if $y(1.0) = 0$ by filling in the table.

Step	0	1	2	3	4
T					
$y'(t)$					
$y(t)$					

6. Write (but do NOT evaluate) an integral that gives the arc length of the graph of $y = \sqrt{x}$ over the interval $[0,3]$.

7. If A is the region bounded by the graphs of $y = x^3$, $y = 1$, and $x = 2$, what is the volume of the solid obtained when A is revolved around the y-axis?

8. Find the solution of the initial value problem:

$$y' - \frac{x}{y^2} = 0 \text{ with } y(0) = 2$$

10. 10. Let A be the region bounded by the graphs of $y = \sqrt{r^2 - x^2}$ and $y = 0$. Using the techniques developed in class, find the volume of the sphere generated when A is rotated about the x-axis.