

NAME _____

I____ II____ III____ IV____ V____ VI____ VII____ VIII____ IX____ TOTAL _____

September 26
2008

Mathematics 106a
Calculus II
Examination #1

Mr. Balcomb

(8) I. The graph of the function $f(x) = \sqrt{x+1}$ is increasing and concave down on the interval $[1, 10]$. Put the following quantities in increasing order: L_{100} , R_{100} , $\int_1^{10} f(x)dx$.

(10) II. Let $I = \int_1^3 x^2 dx$.

A. Use the Fundamental Theorem of Calculus to evaluate I exactly.

B. Write out and add up the four terms in the approximating sums

$$L_4 =$$

$$R_4 =$$

(24) III. Evaluate. [Your final answer should not contain any integrals]:

A. $\int x \cos(x^2 + 1) dx =$

B. $\int \frac{\cos x}{1 + \sin^2 x} dx =$

C. $\int_0^1 \frac{x^2}{x^3 + 4} dx =$

(10) IV. Use Euler's method with four steps on the differential equation $y' = y - t$ to estimate $y(3.0)$ if $y(1.0) = 0$ by filling in the table:

STEP	0	1	2	3	4
t					
$y'(t)$					
$y(t)$					

(8) V. Write (but do not evaluate) an integral that gives the arc length of the graph of $y = e^{2x}$ over the interval $[1, 2]$.

(10) VI. If A is the region bounded by the graphs of $y = x^4$ and $y = x$, what is the volume of the solid obtained when A is revolved around the y -axis?

(10) VII. Set up and evaluate an integral that gives the area between the graphs of $y = x^{1/3}$ and $y = x$. Do not approximate the area, but rather calculate it exactly.

(10) VIII. Find the solution of the initial value problem:

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

(10) IX. A bucket that weighs 80 lb when filled with water is lifted from the bottom of a well that is 100 feet deep. The bucket has a hole in it, so it weighs only 60 lb when it reaches the top of the well. The water leaks out at a constant rate and the rope weighs 0.45 lb/ft. Set up but do not evaluate an integral whose value is the work required to lift the bucket from the bottom of the well to the top.