

Name _____

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Mathematics 106 ABC
Calculus II
Examination #1

Mr. Balcomb

1. The graph of the functions $f(x) = x^{3/2}$ is increasing and concave up on the interval $[1,5]$. Put the following quantities in increasing order: L_{100} , R_{100} ,

$$\int_1^5 f(x)dx, T_{100}, M_{100}$$

2. Let $I = \int_0^2 x dx$

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. $\int (e^x+1)(e^x+x)dx$

B. $\int \frac{x^2}{9-x^3}dx$

C. $\int \frac{x}{\sqrt{1-x^4}} dx$

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

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

5. Consider the function $y = 2x^{3/2} + 3$ over the interval $[0,9]$.

A. Write an integral that gives the arc length of the graph over the interval $[0,9]$.

B. Evaluate this integral.

6. If A is the region bounded by the graphs of $y = e^x$, $y = 0$, $x = 0$, and $x = 1$, what is the volume of the solid obtained when A is revolved around the x -axis?

7. Set-up and evaluate an integral that gives the area between the graphs of $y = \sin(x)$ and $y = \cos(x)$ over the interval $[\pi/4, 3\pi/4]$. Do not approximate the area, but rather calculate it exactly.

8. Find the solution of the initial value problem:

$$y' = \frac{x^2+2}{3y^2} \text{ with } y(0) = 1.$$

9. A bucket that weighs 50 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 25lb when it reaches the top of the well. The water leaks out at a constant rate and the rope weighs 0.65 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.