

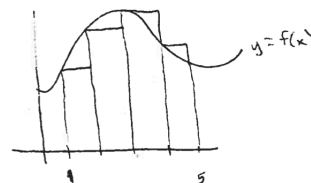
MATH 105 EXAM #4

First, put your name on each page. Show all your work for partial credit. Please circle your answers. Good luck.

1. T or F. If $f(x)$ is concave up and increasing on $x = a$ to $x = b$, then the LEFT rule will give an overestimate.
2. T or F. $\int_{-a}^a x^3 dx = 0$ for all a .

3. For the following picture, fill in the blanks.

- (a) $a = \rule{1cm}{0.4pt}$
- (b) $b = \rule{1cm}{0.4pt}$
- (c) $n = \rule{1cm}{0.4pt}$
- (d) Riemann rule = $\rule{1cm}{0.4pt}$ (left, right, mid)
- (e) Estimate = $\rule{1cm}{0.4pt}$ (over, under, exact)



4. Match items on the left side to those on the right side. Items may have 0, 1, or 2 lines emanating from them.

Approximate area under $y = f(x)$ from $x = a$ to $x = b$

Exact area under $y = f(x)$ from $x = a$ to $x = b$

$$\frac{b-a}{n} \sum_{i=1}^n f(x_i)$$

$$\lim_{n \rightarrow \infty} \frac{b-a}{n} \sum_{i=1}^n f(x_i)$$

$$\sum_{i=1}^n f(x_i)$$

$$\lim_{n \rightarrow \infty} f(x_i) \sum_{i=1}^n \frac{b-a}{n}$$

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

$$\frac{b-a}{100} \sum_{i=1}^{100} f(x_i)$$

5. Consider the following mathematical statement: $\int x \ln x \, dx = .5 x^2 \ln x - x^2 + c$. Either verify that the statement is true or show why it is false.

6. Evaluate $\int (e^x - x^2 + 7) \, dx$.

7. Evaluate $\int [(2x + 3)^2] \, dx$.

8. Evaluate $\int_{0.1}^2 (\frac{1}{x} + 4) \, dx$ and draw the corresponding picture.

9. Consider the following function

$$f(x) = \begin{cases} x + 1, & 0 \leq x \leq 1 \\ -x^2 + 3, & 1 \leq x \leq 3. \end{cases}$$

Calculate the exact area of the region that lies under $f(x)$ and above the x -axis.