

MAT 254 – Winter Quarter 2002
Test 2

NAME _____

Show work and write clearly.

1. (30 pts.) Without using the *allsums* program,

- (a). Estimate the area (to 4 decimal places) under the graph of $f(x) = 3x + 4x^2 - x^3$ from $x = 2$ to $x = 5$ using three approximating rectangles and right endpoints. Sketch the graph and the rectangles. Is your estimate an underestimate or an overestimate? Explain.
- (b). Repeat using midpoints.

2. (40 pts.) Use the Fundamental Theorem of Calculus to evaluate the integral, or explain why it does not exist. For trig functions, you may estimate the answer to 4 decimal places.

a. $\int_p^{3p} (x + \sin x) dx$

b. $\int_0^2 e^{2x} dx$

c. $\int_1^3 \frac{2}{\sqrt[3]{x^2}} dx$

3. (10 pts.) Calculate the left-hand, right-hand, midpoint and trapezoid sums with 100 subdivisions. Which of these sums are overestimates and which are underestimates? Explain. Estimate the value of

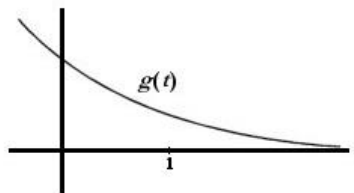
the definite integral. Explain. $\int_0^3 [\ln(30 - x^3) - 2] dx$.

4. (10 pts.) The graph of g is shown below. The results from the left, right, midpoint and trapezoid

rules used to approximate $\int_0^1 g(t) dt$, with the same number of subdivisions for each rule, are as follows:

0.601, 0.632, 0.633, 0.664.

- a. Match each rule with its approximation. Explain.
- b. Between which two approximations does the true value of the integral lie? Explain.



5. (10 pts.) Is $\int_{-1}^1 e^{x^2} dx$ positive, negative or zero? Explain.