

Name: \_\_\_\_\_

This quiz covers: 5.8 and 5.9. DUE: Monday 2/20

**Directions:** Complete all questions and **show all applicable work**. Partial credit will be given.

1.) (4pt) (Chapter 5.8) Calculate the following integral utilizing the Table of Integrals (reference pages) in the back of your textbooks.

$$\int \tan^4 3x \, dx$$

2.) (Chapter 5.9) Given the function  $f(x) = e^x$  on the interval  $(0, 3)$ , find the area under the curve by using the following approximations with 5 boxes each. For the starred items, also place a bound on the error.

- (2pt) Left end points
- (2pt) Right end points
- (3pt) Midpoint Rule \*\*\*
- (3pt) Trapezoidal Rule \*\*\*
- (3pt) Simpson's Method \*\*\*

Given the error bounds, which of the latter three appears to be the best solution?

3.) (4pt) Now that the above approximations have been computed, calculate the exact solution and definitively state which approximation was the best. Does this match the error bounds? Does it have to?

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HINTS: The first question requires (1) a substitution for  $3x$ , then (2) uses a given formula from the tables. The answer will require using the table again a second time, as the first has an integral remaining. Be sure to substitute back into  $x$ . Question second and third questions are largely computational in nature. Please see examples from the notes. Error bounds give a worse case situation and typical behavior is better than the bound suggests. The exact solution is derived from integration.