

MAT 162—Exam #2—10/21/15

Name: _____

Show all work using correct mathematical notation. Calculators are not allowed.

1. (6 points) Fill in the initial set-up for applying integration by parts to $\int x^2 \sin 3x \, dx$.

$$u = \qquad \qquad \qquad dv =$$

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2. (4 points) Which of the following is the correct form of the partial fraction decomposition for the function $f(x) = \frac{1}{x^3 + 4x^2}$?

(i) $\frac{A}{x^2} + \frac{B}{x+4}$

(iv) $\frac{A}{x^3} + \frac{B}{x^2}$

(ii) $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x+4}$

(v) $\frac{A}{x} + \frac{B}{x^2} + \frac{Cx+D}{x^2+4}$

(iii) $\frac{A}{x} + \frac{Bx+C}{x^2+4}$

(vi) none of the above

3. (15 points) Evaluate $\int \sin^4 x \cos^3 x \, dx$.

4. (12 points) Evaluate $\int x^7 \ln x \, dx$.

5. (13 points) Consider the integral $\int_3^5 \sqrt{x} \, dx$.

(a) Write out the terms in the Midpoint Rule approximation M_4 .

(b) Find an upper bound for the error when approximating the integral using T_{10} , the Trapezoidal Rule with 10 subintervals.

6. (10 points) Evaluate $\int_8^{\infty} \frac{1}{x^{4/3}} dx$.

7. (15 points) Evaluate $\int \frac{1}{\sqrt{x^2 + 9}} dx$.

8. (7 points) Determine whether the improper integral $\int_1^{\infty} \frac{\sin^2 x}{x^4 + 5} dx$ converges or diverges. You must clearly state the inequalities used to make a comparison.

9. (18 points) Evaluate $\int \frac{2x + 1}{x^3 + x} dx$.