

MAT 162—Exam #2—10/25/11

Name: _____

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

1. (10 points) Evaluate $\int \frac{2x + 5}{x^2 - 3x + 2} dx$.

2. (15 points) Evaluate $\int x^2 e^{3x} dx$.

3. (10 points) Evaluate $\int \frac{2x+1}{x^2+9} dx$. *Hint:* Split the integral into two parts.

4. (15 points) Evaluate $\int \sin^2 x \cos^5 x dx$.

5. (10 points) Evaluate the improper integral $\int_0^4 \frac{1}{\sqrt{x}} dx$, or show that it diverges.

6. (15 points) Consider the integral $\int_3^5 \ln x dx$.

(a) Use Simpson's Rule with $N = 4$ to approximate the integral. Just write out the terms in your sum—do not attempt to add them up.

(b) Determine the maximum possible error in your estimate from part (a). You may leave your answer in messy form—do not attempt to do any complicated arithmetic.

7. (18 points) Evaluate $\int \frac{x^3}{\sqrt{4+x^2}} dx$.

8. (7 points) Consider the improper integral $\int_2^{\infty} \frac{x+x^2}{x^3-1} dx$.

(a) Does the integral converge or diverge?

(b) Which of the following integrals can the original be compared with to reach the above conclusion? (Circle all that apply.)

(i) $\int_2^{\infty} \frac{1}{x^{2/3}} dx$ (ii) $\int_2^{\infty} \frac{1}{x} dx$ (iii) $\int_2^{\infty} \frac{1}{x^2} dx$ (iv) $\int_2^{\infty} \frac{1}{x^3} dx$