Math 221   EXAM 1
June 16, 2017

Student’s Name:

Instructor’s Name:

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Show all work in detail for full credit. No books and calculators are permitted. Use the back page as a sketch paper.

1. Use substitution to find the antiderivative.

   (a) (6 points) \( \int \frac{x^2}{(x^3-3)^3} \, dx \)

   (b) (6 points) \( \int t sin(t^2) cos(t^2) \, dt \)
2. Evaluate following integrals using integrating by parts.

(a) (6 points) \( \int \limits_0^1 x e^{-x} \, dx \)

(b) (6 points) \( \int x^2 \sin x \, dx \)
3. Evaluate following trigonometric integrals.

(a) (6 points) \( \int \cos^3 x \sin^2 x \, dx \)

(b) (6 points) \( \int_0^{2\pi} \sin(2x) \cos(x) \, dx \)
4. (12 points). Evaluate following integral using trigonometric substitution: \[ \int \frac{\sqrt{x^2 - 25}}{x} \, dx \]
5. Evaluate following integrals:

(a) (6 points). Use method of partial fraction: \( \int \frac{3x^2}{(x-1)(x^2+x+1)} \, dx \)

(b) (6 points). \( \int_{0}^{2} \frac{dx}{\sqrt{4-x^2}} \). Does this improper integral converge or diverge?