Name:_____

Student ID:_____

Section:_____

Instructor:_____

Math 2414 (Calculus II)
Final Exam

Instructions:

- Work on scratch paper will not be graded.
- Show all your work in the space provided. Full credit will be given only if the necessary work is shown justifying your answer.
- **Please write neatly. If I cannot read your handwriting, you will not receive credit.**
- Simplify your answers as much as possible. Expressions such as $\ln(1)$, e^0, $\sin(\pi/2)$, etc. must be simplified for full credit.

Show all work in the space provided. Full credit will be given only if all steps are shown justifying your answer. Please write neatly and carefully, if I cannot read your handwriting, you will receive NO credit.

1. (10 points) Find the integrals (show all work): $\int xe^{-x^2}dx$.

2. (10 points) Apply the **disk/washer method** to set up the integral (**DO NOT EVALUATE**) to find the volume of the solid formed by revolving the region bounded by the given graphs about the given axis.

   (a) $y = \sqrt{3x-2}$, $x = 0$, $y = 0$, $y = 1$ about the y-axis. (Hint: solve for x as a function of y first)

   (b) $y = e^{-x}$, $y = 1$, $x = 2$ about $y = 2$.

3. (10 points) Find the arc length of the given function over the given interval: $x = \frac{1}{3}(y^2+2)^{3/2}$ over $0 \leq y \leq 4$.

4. (10 points) Set up the integral (**DO NOT EVALUATE**) to find the surface area of the surface generated by revolving the curve on the given interval about the y-axis.

$$y = \sqrt[3]{x} + 2, 1 \leq x \leq 8.$$

5. (10 points) Find the given integral: $\int xe^{4x}dx$.

6. (10 points) Find the integral (show all work.)

$$\int \frac{\sin x}{\cos^2(x) - 3\cos(x)}dx.$$

7. (10 points) Find the degree 4 Taylor polynomial centered at 2 of $f(x) = \ln(x)$.

8. (10 points)Find the radius of convergence for the given series:

$$\sum_{n=1}^{\infty} \frac{x^{5n}}{n!}.$$

9. (10 points) Use the power series centered at 0 for $f(x) = \dfrac{1}{1-x}$ to find a power series centered at 0 for $g(x) = \dfrac{1+x}{(1-x)^2}$.

10. (10 points) Find the Maclaurin series for the function: $u(x) = \cos(4x)$.

END OF EXAM