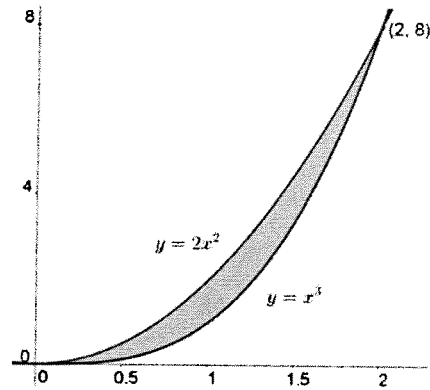


Math 1352 Final Exam - Fall 2011

Calculators are not allowed on this exam. Work all questions completely. Show all work as described in class. Copyright 2011 Dept of Mathematics and Statistics, Texas Tech University. Unauthorized reproduction prohibited.

1. Consider the region bounded by $y = 2x^2$ and $y = x^3$. **Set up** integrals to find the

- (a) Area of the region
- (b) Volume of the solid formed by rotating the region about the y -axis.
- (c) Volume of the solid formed by rotating the region about the line $y = -3$.
- (d) Moment of the region about the x -axis.



2. Graph $r = 3 \sin(2\theta)$ and find the area of one leaf.

3. Evaluate the following integrals:

(a) $\int x^2 \cos(2x) dx$

(b) $\int \frac{3x - 2}{x(x + 2)} dx$

(c) $\int \frac{1}{x^2 \sqrt{9 - x^2}} dx$

(d) $\int 2x^2(x^3 + 1)^5 dx$

4. Does $\int_2^{\infty} \frac{dx}{x(3 + \ln x)^2}$ converge? Is so, find its value. If not, explain why not.

5. Do the following series converge or diverge? Identify any tests you use and show all the work needed to apply them.

(a) $\sum_{k=1}^{\infty} \frac{k + 3}{2^k}$

(b) $\sum_{k=1}^{\infty} \frac{3}{k(k + 1)}$

(c) $\sum_{k=2}^{\infty} \frac{k^k}{5k - 1}$

6. Does the series $\sum_{k=2}^{\infty} \frac{(-1)^k \ln k}{k}$ converge absolutely, converge conditionally, or diverge?

Identify any tests you use and show all the work needed to apply them.

7. Find the radius and interval of convergence of the power series $\sum_{k=1}^{\infty} \frac{4}{\sqrt{k} 2^k} (x - 3)^k$.

8. Find the first 3 terms of the Maclaurin series for $(1 + x)^{\frac{1}{2}}$.

9. For the vectors $\mathbf{u} = \langle 0, 2, -3 \rangle$ and $\mathbf{v} = \langle 1, 0, -1 \rangle$,

(a) Find $\|\mathbf{u} - 2\mathbf{v}\|$

(b) Find $\mathbf{v} \times \mathbf{u}$

(c) Are \mathbf{u} and \mathbf{v} orthogonal? Why or why not?