

Math 132, Final Exam
Fall 2002

Name: _____

Section: _____

ID number: _____

- No papers or notes may be used, but you can use your calculator.
- Please don't just give an answer. Clearly explain how you get it.
- This is a 2 hour exam.

Problem	Grade
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total (out of 90)	

1) Using the root test, find whether the series is convergent or divergent:

$$\sum_{n=1}^{\infty} \left(\frac{n^2 + 2}{2n^2 - 1} \right)^n$$

- 2) A particle moves on a straight line with initial velocity 4 m/s and acceleration given by $a(t) = -1 \text{ m/s}^2$.
- (a) Find the total distance traveled by the particle during the first 6 seconds.
 - (b) Find the total displacement of the particle during the first 6 seconds.

- 3a) Sketch the area enclosed by the curves $y = x^2 - 4$ and $y = 4 - x^2$.
- 3b) Evaluate this area.

4) Evaluate the integral (show your work)

$$\int_0^{\pi/2} \sin^5(x) \cos^2(x) dx$$

5) Find the points on the parametric curve $x(t) = t(t^2 - 3)$, $y(t) = 3(t^2 - 3)$ where the tangent is horizontal and the points where it is vertical.

6) Find the values of x for which the series converges. Find the sum of the series for those values of x

$$\sum_{n=0}^{\infty} \left(\frac{\ln x}{2} \right)^{2n}$$

Hint: Reshape it into a geometric series.

7) Use the integral test to show convergence and divergence of the following series:

1. The convergence of

$$\sum_{n=1}^{\infty} \frac{1}{1+n^2}$$

2. The divergence of

$$\sum_{n=1}^{\infty} \frac{\ln(n)}{n}$$

8) Find the interval and radius of convergence of the power series

$$\sum_{i=1}^{\infty} \frac{(-1)^n 3^n}{n} (x - 1)^n$$

9a) Evaluate the following indefinite integral as a power series:

$$\int x^2 e^{-x^2} dx$$

9b) Why does the series have an infinite radius of convergence ?