

132, Spring 2002, Exam 4 (Final Exam)

Name \_\_\_\_\_ ID Number \_\_\_\_\_

No calculators with a CAS are allowed. Be sure your calculator is set for "radians," not "degrees," if you do any calculus computations with trig functions.

Part I, Multiple Choice, 5 points/problem: mark your answers on the answer card.

1. The force required to hold a certain spring stretched 3 ft. beyond its natural length is 6 lbs. How much work is done in stretching the spring 5 ft. beyond its natural length?

- A) 21 ft-lbs    B) 22 ft-lbs    C) 23 ft-lbs    D) 24 ft-lbs    E) 25 ft-lbs  
F) 26 ft-lbs    G) 27 ft-lbs    H) 28 ft-lbs    I) 29 ft-lbs    J) 30 ft-lbs

2. A certain series  $\sum_{n=1}^{\infty} a_n$  has the following partial sums:

$$\begin{aligned} s_1 &= 5 \\ s_2 &= -1 \\ s_3 &= 6 \\ s_4 &= 4 \\ s_5 &= 1 \\ &\dots \end{aligned}$$

What is  $a_4$ ?

- A) 0            B) -2            C) 2            D) -1            E) 1  
F)  $-\frac{1}{2}$         G)  $\frac{1}{2}$             H) -3            I) 3            J) 4

3. Write the Taylor series for  $\sin(x^2)$  and use the first three terms of that series to compute an estimated value for  $\int_0^1 \sin(x^2) dx$ . (Round your answer to 6 decimal places. The approximation is fairly accurate – the actual value of the integral, rounded to 6 decimal places, is 0.310268 !)

- A) 0.276371   B) 0.211832   C) 0.277819   D) 0.303121   E) 0.308127  
F) 0.310281   G) 0.310621   H) 0.311202   I) 0.313703   J) 0.313907

4. Suppose  $s = \sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{n^2}$  and let  $s_n$  be the sum of the first  $n$  terms. Which one(s) of the following statements are true?

- i)  $s_7 < s$
- ii)  $|s - s_7| < 0.001$
- iii)  $s_8 < s < s_7$
- iv)  $s_n \rightarrow 0$  as  $n \rightarrow \infty$

- |                     |                       |                   |                  |
|---------------------|-----------------------|-------------------|------------------|
| A) i) only          | B) ii) only           | C) iii) only      | D) iv) only      |
| E) i),ii) only      | F) i),iv) only        | G) ii), iii) only | H) ii), iv) only |
| I) i),ii), iv) only | J) ii),iii), iv) only |                   |                  |

5. Suppose  $a$  is a positive constant. A curve is given with the parametric equations

$$\begin{cases} x = at \\ y = 3t + a \end{cases} \text{ for } 0 \leq t \leq 2$$

The curve has length  $4\sqrt{5}$ . What is  $a$ ?

- |                  |                  |                |               |                |
|------------------|------------------|----------------|---------------|----------------|
| A) 0             | B) 2             | C) 7           | D) $\sqrt{3}$ | E) $\sqrt{5}$  |
| F) $\frac{1}{2}$ | G) $\frac{1}{3}$ | H) $\sqrt{11}$ | I) 13         | J) $\sqrt{15}$ |