

Your name: _____

Rec. Instr.: _____

Rec. Time: _____

Show all your work in the space provided under each question. Please write neatly and present your answers in an organized way. You may use your one sheet of notes, but no books or calculators. This exam is worth 60 points. The chart below indicates how many points each problem is worth.

Problem	1	2	3	4
Points	/8	/6	/12	/8
Problem	5	6		Total
Points	/8	/18		/60

1. Find the arc length of the curve.

$$y = \frac{1}{3} x^{\frac{3}{2}} = \frac{\sqrt{x^3}}{3} \quad \text{for} \quad 0 \leq x \leq 4$$

2. A force of 3 pounds will stretch a spring six inches from its equilibrium or natural length. Find the work (in foot-pounds) required to stretch the spring from its natural length to a length of six inches beyond its natural length.

3. Find the centroid of the region under $y = e^x$ for $0 \leq x \leq 1$.

(a) Find the area bounded by $y = e^x$, $x = 0$, $x = 1$, and $y = 0$.

(b) Find the moment M_x with respect to the x -axis.

(c) Find the moment M_y with respect to the y -axis.

(d) Compute the centroid $(\bar{x}, \bar{y})$.

4. Determine whether the sequence converges (compute a limit).

$$a_n = \frac{\ln(n^2 + 1)}{n}$$

5. (a) Write out the first three terms a_1, a_2 and a_3 for the sequence.

$$a_n = \frac{3^{n+1}}{2^{2n-1}}$$

- (b) Evaluate the sum of the geometric series.

$$\sum_{n=1}^{\infty} \frac{3^{n+1}}{2^{2n-1}}$$

6. Determine whether the series converges; list each test of convergence used.

(a)

$$\sum_{n=1}^{\infty} \frac{7n-1}{4n+3}$$

(b)

$$\sum_{n=1}^{\infty} \frac{7n-1}{4n^2+3}$$

(c)

$$\sum_{n=1}^{\infty} \frac{7n-1}{4n^3+3}$$