

Final Exam Monday-April 21, 2003 10:00-11:50 CLAPP L9
Review-Exam 3

1. Set up the integral for the arclength of the curve given by

$$x(t) = 4t, \quad y(t) = 3t^3 \quad \text{for } 0 \leq t \leq 3.$$

2. Set up the integral (simplified) for the arclength of the curve given by

$$x(t) = t \sin t, \quad y(t) = t \cos t \quad \text{for } 0 \leq t \leq 2\pi.$$

3. Determine (\bar{x}, \bar{y}) , the center of mass, centroid of the region bounded by $y = 9x - x^3$ and the x -axis on $0 \leq x \leq 3$.

4. State yes or no for convergence of the given series.

(a) $\sum_{n=1}^{\infty} \frac{1}{n^3}$ _____

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

(b) $\sum_{n=0}^{\infty} \frac{(-1)^n}{(3n+1)}$ _____

(e) $\sum_{n=1}^{\infty} \frac{-1}{n}$ _____

(c) $\sum_{n=0}^{\infty} \frac{4^{n+1}}{3^{2n}}$ _____

(f) $\sum_{n=1}^{\infty} 3 \cdot 2^{-n}$ _____

5. Determine the Taylor Series for $f(x) = \frac{1}{\sqrt{9-3x}}$ for $-3 < x < 3$.

6. Determine the Taylor Series for $f(x) = e^x$ about $x = 0$. (Show your work.)

(a) Determine the Taylor Series for $g(x) = e^{3x}$ about $x = 0$.

7. Determine the Taylor Series for $h(x) = \frac{1}{x^2}$ about $x = 1$.

8. Determine the Taylor Series for $f(x) = \frac{4}{1-3x}$ about $x = 0$

(a) Determine the Taylor Series for $g(x) = \frac{4}{(1-3x)^2}$ about $x = 0$.

(b) Determine the Taylor Series for $h(x) = \ln(1-3x)$ about $x = 0$.

(c) What is the interval of convergence for these three series?

9. Determine the sum of the series.

$$\sum_{n=0}^{\infty} \frac{(-1)^n}{n+1} = \underline{\hspace{2cm}}$$

$$\sum_{n=0}^{\infty} \frac{3^{2n+1}}{10^n} = \underline{\hspace{2cm}}$$

$$\sum_{n=0}^{\infty} \frac{(-2)^n}{n!} = \underline{\hspace{2cm}}$$

$$\sum_{n=0}^{\infty} \frac{1}{n!} = \underline{\hspace{2cm}}$$

$$\sum_{n=0}^{\infty} \left(\frac{1}{2}x\right)^n = \underline{\hspace{2cm}} \quad \text{if } \underline{\hspace{2cm}}$$

10. Determine the interval of convergence of the series $f(x) = \sum_{n=0}^{\infty} \frac{x^{2n}}{2n+1}$.