

Name.....J Number.....Score.....

Show All Work.

1. Find the integrals.(32)

(a) $\int \frac{1}{\sqrt{x^2+4}} dx$;
(b) $\int x^7(\sqrt[3]{x^4+1}) dx$;
(c) $\int \sin^{\frac{3}{2}} x \cos^3 x dx$;
(d) $\int \frac{3x}{x^2-4x+4} dx$.

2. Find the area of the region that is inside the cardioid
- $r = 2 + 2 \cos \theta$
- and outside the circle
- $r = 3$
- .(10)

3. Find the coordinates of the center of mass of a region bounded by the parabola
- $y = x^2$
- and the line
- $y = 3x$
- .(10)

4. Find the arc length of the curve
- $y = x^2 - \frac{1}{4} \ln x$
- from
- $x = 1$
- to
- $x = 3$
- .(10)

5. Determine whether the series absolutely converges conditionally converges or diverges.(20)

(a) $\sum_{k=1}^{\infty} \frac{5k^2}{\sqrt{k^8+1}}$;
(b) $\sum_{k=2}^{\infty} \frac{2^{3k}}{7^k}$;
(c) $\sum_{k=1}^{\infty} (-1)^k \frac{\ln k}{k}$;
(d) $\sum_{k=1}^{\infty} \left(1 + \frac{1}{k}\right)^k$.

6. Find the convergence set of
- $\sum_{k=1}^{\infty} \frac{2^k(x-3)^k}{k^2}$
- .(6)

7. Find the Taylor series about
- $x = a$
- for the given function; express your answer in sigma notation(
- Σ
-); then find its radius of convergence and the interval of convergence.(12)

(a) $f(x) = \frac{1}{3+2x}$, at 0;
(b) $f(x) = \ln x$, at 4.