MATH344
Calculus III
Assessment

1. Evaluate the integral.

(a)

$$\int \frac{1+x}{1+x^2}dx,$$

(b)

$$\int \sinh(x)\cosh(x)dx.$$

2. Find the limit, if it exists. If it does not exist, explain why.

(a)

$$\lim_{x\to 0}\frac{\sinh(x)-x}{x^3},$$

(b)

$$\lim_{x\to\infty} x\sin(1/x).$$

3. Evaluate the integral.

(a)

$$\int e^{\theta}\sin(\theta)d\theta,$$

(b)

$$\int \sin^2(x)\sin(2x)dx,$$

(c)

$$\int_0^{2/3}\sqrt{4-9x^2}dx,$$

(d)

$$\int_2^{\infty}\frac{dv}{v^2+2v-3}.$$

4. Find the area of the surface obtained by rotating the curve about the x-axis.

$$y=x^3,\quad 0\le x\le 2.$$

5. Find the area of the region inside the polar curve $r=3\sin(\theta)$ and outside the polar curve $r=1+\sin(\theta)$.

6. Determine whether the series is absolutely convergent, conditionally convergent, or divergent, and prove it.

$$\sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n+1}}.$$

7. Find the Taylor series expansion for $f(x) = \ln(x)$ about $a = 2$, and determine its interval of convergence.

8. Find the equation for the line through the point $(-2, 2, 4)$ and perpendicular to the plane $2x - y + 5z = 12$.

9. Find the equation for the plane through the three points $P = (1, 2, 1)$, $Q = (1, 0, 1)$, and $R = (1, 1, 0)$.