

Exam 2

Show all your work to receive full credit.

1. Differentiate. [6 pts each]

a) $f(x) = x^{\sin x}$

b) $g(t) = 10^t - e^t + t^e - e^\pi$

c) $y = \log_7(3x) \arcsin(2x)$

d) $k(r) = 3^{\arctan(5r)}$

2. Perform a trig substitution to rewrite the integral in terms of trigonometric functions. Do not evaluate the trig integrals. [7 pts each]

a) $\int x^3 \sqrt{1-x^2} dx$

b) $\int \frac{\sqrt{9x^2-25}}{x} dx$

3. Evaluate. [7 pts each]

1. $\int x3^x dx$

2. $\int_1^e x^4 \ln x dx$

4. Find the limit, if it exists. [6 pts each]

1. $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$

2. $\lim_{x \rightarrow 2} \frac{e^x - e^2}{xe^x - e^x - e^2}$

5. Consider the sequence $\{-9, 6, -4, \frac{8}{3}, \dots\}$. Find a formula for the general term a_n , assuming the pattern continues. [6 pts]

6. Determine if the sequence converges. If so, find the limit. [6 pts each]

1. $\{\ln(n+1) - \ln n\}_{n=1}^{\infty}$

2. $\left\{ \frac{\sqrt{4n^6 - 17}}{n^3 - 5n} \right\}_{n=1}^{\infty}$

7. Evaluate. [7 pts each]

a) $\int \frac{\sin^2 \theta}{\cos \theta} d\theta$

b) $\int \sin^3 x \cos^3 x dx$

c) $\int \cos^4 t dt$

d) $\int \frac{dy}{(\ln 3)(y)(1 + (\log_3 y)^2)}$