Group 1 Cumulative Practice Exam

1) Integration by Parts – Evaluate the indefinite integral:

$$\int 4x\cos(8x)\,dx$$

2) Trigonometric Substitution (*adjusted*) – Evaluate the indefinite integral:

$$\int \frac{2\sqrt{x^2-36}}{x^4}\,dx$$

3) Partial Fraction Decomposition – Evaluate the indefinite integral:

$$\int \frac{5x^2-10x+8}{x(x-2)^2}\,dx$$

4) Improper Integration (*adjusted*) – Determine whether the integral is divergent or convergent. If it is convergent, evaluate it. If it is divergent, answer "divergent".

$$\int_{-5}^{0} \frac{11}{\sqrt[7]{(x+2)^9}}\,dx$$

5) Series Tests - Determine whether the following series converges or diverges. In your written work, state any convergence tests you used to determine your answer.

$$\sum_{n=1}^{\infty} \left(\frac{n+3}{5n-4}\right)^n$$

6) Alternating Series Test – Determine whether the following series converges absolutely, converges conditionally, or diverges. In your written work, state any convergence tests you used to determine your answer.

$$\sum_{n=1}^{\infty} (-1)^n \frac{1}{5n+1}$$

7) Power Series - Find the center, radius of convergence and interval of convergence for the power series.

$$\sum_{n=0}^{\infty} \frac{(x-2)^n}{n+9}$$

8) Washers - Find the volume of the solid obtained by rotating the region bounded by the graphs of $y=13-x, y=2x+10, x=-5$ about the x-axis.

Practice Exam – Differentiation Options (Extra Practice)

Use only when students may need extra practice and have difficulties solving problems that would appear on the exam.

1) Evaluate the definite integral.

TOPIC: Antiderivatives (L1) and Definite Integrals (L2)

$$\int_1^4 8x^3 + 8x^7 - 20x^4\,dx$$

2) Evaluate the indefinite integral.

TOPIC: Integration by Substitution (L3)

$$\int \frac{dx}{x - 60}$$

3) Evaluate the indefinite integral.

TOPIC: Integration by Parts (L4)

$$\int x * \sin(x)\,dx$$

4) Evaluate the indefinite integral using trig tables.

TOPIC: Integration Resulting in Inverse Trigonometric Functions

$$\int \frac{dx}{\sqrt{81 - x^2}}$$

5) Evaluate the indefinite integral.

TOPIC: Trigonometric Integrals (L5)

$$\int \sin^3(x) * \cos^4(x) dx$$

6) Evaluate the indefinite integral.

TOPIC: Trigonometric Substitution (L6)

$$\int \sqrt{x^2 + 25}\,dx$$

7) Evaluate the indefinite integral.

TOPIC: Partial Fraction Decomposition (L8)

$$\int \frac{5x - 1}{(x + 3)(x - 5)}\,dx = \frac{A}{x + 3} + \frac{B}{x - 5}$$

8) Determine whether the integral is divergent or convergent. If it is convergent, evaluate it. If it is divergent, answer "divergent."

TOPIC: Improper Integrals (L10)

$$\int_0^2 \frac{dx}{x^2}$$

9) Find the Maclaurin Polynomial of degree 4 for f(x) = sin(x), centered at a = 0.
TOPIC: Taylor and Maclaurin polynomials (L11)

10) If the following series converges, compute its sum. Otherwise, enter +∞ if it diverges to infinity, -∞ if it diverges to minus infinity, and DIV otherwise.
TOPIC: Infinite Series (L14)

$$\sum_{n=0}^{\infty} \frac{1}{n^{1.6}}$$

11) If the following series converges, compute its sum. Otherwise, enter +∞ if it diverges to infinity, -∞ if it diverges to minus infinity, and DIV otherwise.
TOPIC: Infinite Series (L14) – Alternating Series

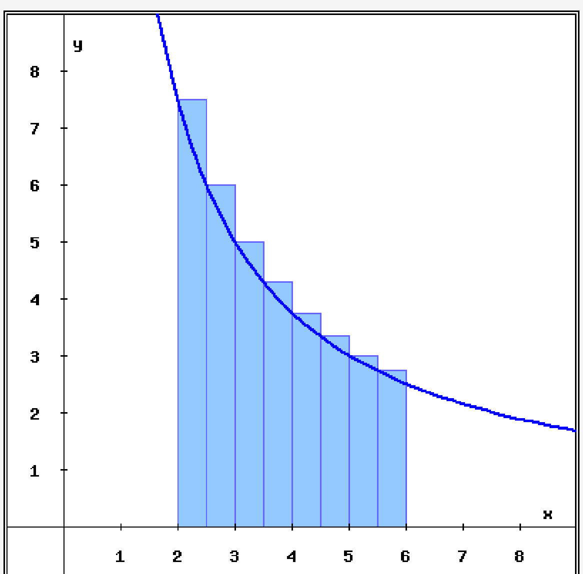
$$\sum_{n=0}^{\infty} (-1)^n \frac{3n^2}{5n^2 - 6n}$$

12) If the following series converges, compute its sum. Otherwise, enter +∞ if it diverges to infinity, -∞ if it diverges to minus infinity, and DIV otherwise.
TOPIC: Infinite Series (L14) – Series Involving Exponentials and Factorials

$$\sum_{n=0}^{\infty} (-1)^n \frac{5^n}{2n!}$$

13) Compute the Riemann sum.

(1 point) The rectangles in the graph below illustrate a left endpoint Riemann sum for $f(x) = (15/x)$ on the interval $[2, 6]$.
The value of this left endpoint Riemann sum is ☐, and this Riemann sum is
[select an answer] the area of the region enclosed by $y = f(x)$, the x-axis, and the vertical lines x = 2 and x = 6.



Left endpoint Riemann sum for $y = (15/x)$ on $[2, 6]$