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## Exam 2 Practice Answer Key

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1. Consider the differential equation

$$\frac{dy}{dx} = \frac{x}{y}.$$

(a)  $y^2 = x^2 + C$

(b)  $y^2 = x^2 - 3$

2. Determine whether each of the following improper integrals converges or diverges.

(a) diverges

(b) converges

(c) diverges

3. Determine whether each of the following sequences  $\{a_n\}$  converges. If the sequence converges, find its limit.

(a) converges to 0

(b) converges to 0

(c) diverges

(d) converges to  $e^2$

4. Find the sums of the following series.

(a)  $3/4$

(b)  $65/12$

5. Determine whether each of the following series converges.

(a) diverges

(b) converges

(c) converges

(d) converges

(e) converges

6. converges absolutely

7. converges conditionally

8.  $R = 1, I = (-1, 1]$

9.  $\sum_{n=0}^{\infty} (-1)^n x^{4n+1}$ ,  $(-1, 1)$
10.  $1 - 1 + 1 - 1 + 1 - 1 + \dots$  is a geometric series with  $r = -1$  which diverges, so any calculations involving the second line are meaningless.
11. Suppose that  $\{a_n\}$  is a sequence such that  $\lim_{n \rightarrow \infty} a_n = 3$ . Define the sequence  $\{b_n\}$  by  $b_n = a_n + \frac{2n-3}{5n+1}$ .
- (a) The sequence  $\{b_n\}$  converges to  $17/5$ .
- (b) The series diverges.