Exam 3
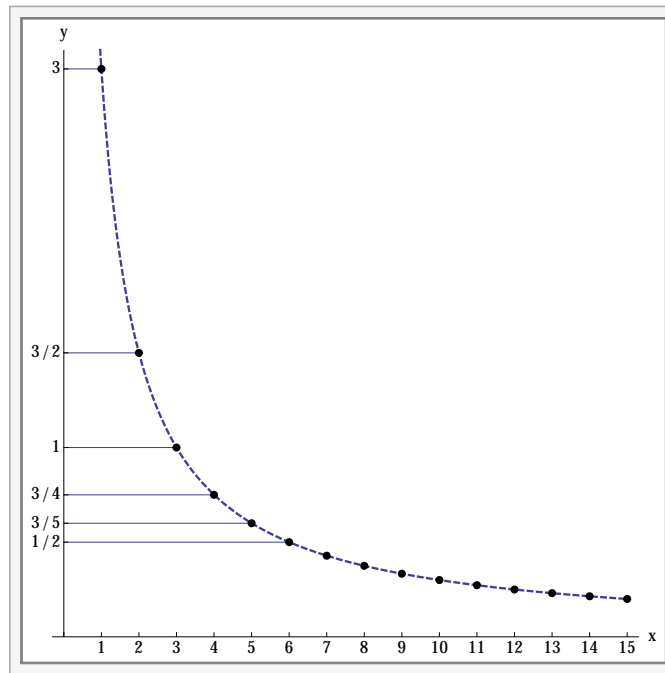
Name:

P 1 (2 Points). State the Divergence Test.

P 2 (2 Points). State the Integral Test.

P 3. [4 Points] Consider the graph of f below.

Use the graph of f to answer the following.

(a) Consider the sequence

$$a_n = f(n), \ n \geq 1.$$

Find $\lim\limits_{n \to \infty} a_n$.

(b) Consider the sequence

$$b_n = \cos[f(n)], \ n \geq 1.$$

Find $\lim\limits_{n \to \infty} b_n$.

(c) Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} f(n)$$

(d) Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} [f(n)]^2$$

P 4 (10 Points). Determine whether the series converges or diverges. If it converges, find its sum.

$$\sum_{n=0}^{\infty} \frac{3^{n+1}}{7^n}$$

P 5 (10 Points). Determine whether the series converges or diverges. If it converges, find its sum.

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

P 6 (10 Points). Determine whether the series converges or diverges, explain why.

$$\sum_{n=0}^{\infty} \frac{2n+1}{3n+2}$$

P 7 (10 Points). Determine whether the series converges or diverges, explain why.

$$\sum_{n=1}^{\infty} ne^{-n}$$

P 8 (10 Points). Determine whether the series converges absolutely, conditionally, or diverges, and explain why.

$$\sum_{n=2}^{\infty} \frac{(-1)^n}{\sqrt{n}}$$

P 9 (10 Points). Find the third Maclaurin polynomial of $f(x) = e^{-3x}$.

P 10 (10 Points). Find Taylor series of

$$f(x) = \frac{1}{x}$$

centered at 1.

P 11 (10 Points). Determine if the series converges or diverges, explain why.

$$\sum_{n=1}^{\infty} \frac{2}{6n+1}$$

P 12 (12 Points)**.** Determine the interval of convergence.

$$\sum_{n=1}^{\infty} \frac{(x-3)^n}{\sqrt{n}}$$

P 13 (Bonus 2 Points). Find the limit

$$\lim_{x \to 0} \frac{e^x - 1}{x}$$

P 14 (Bonus 2 Points). Find the sum

$$\sum_{n=0}^{\infty} \frac{1}{5^n n!}$$