

Name: _____

1. Fill in the blanks (short answers).

(a) If a sequence is bounded and _____, then it will converge.

(b) A p -series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ will converge if and only if _____.

(c) Suppose $f(k) = a_k$, where f is continuous, positive and decreasing and $\sum a_n$ is convergent. Then, the remainder

$R_n = s - s_n$ satisfies

_____ $\leq R_n \leq$ _____.

(d) We say a sequence $\{a_n\}$ is bounded below if _____
_____.

2. Eliminate the parameter in the following:

(a) $x = e^{3t}$, $y = t + 4$

(b) $x = 3 \sin \theta$, $y = 5 \cos \theta$

3. Find an equation of the line tangent to the parametrically defined function $x = e^{\sqrt{t}}$, $y = t - \ln t^2$ when $t = 1$.

4. Sketch the curve with the polar equation $r = 1 + \sin \theta$ and find the exact area inside it.

5. Find the length of the curve $x = 1 + 3t^2$, $y = 4 + 2t^3$ where $0 \leq t \leq 1$.

6. Determine whether the following series converge or diverge.

$$(a) \sum_{n=1}^{\infty} \frac{3 + 2n}{(1 + n^2)^2}$$

$$(b) \sum_{n=1}^{\infty} \frac{1}{9 + n^2}$$

(c) $\sum_{n=1}^{\infty} \frac{1}{1+2^n}$

7. Express the number $.213131313\dots$ as a ratio of two integers.