Math 252

Series Samples Name:____________________

Show all relevant work!

9.4

1. For each series below, identify the test best suited to determine convergence or divergence.

(a) $\displaystyle\sum_{k=1}^{\infty} \frac{k}{(k+1)^2}$ (b) $\displaystyle\sum_{k=1}^{\infty} \frac{(-1)^{k-1}}{\sqrt{3k-1}}$ (c) $\displaystyle\sum_{k=1}^{\infty} \frac{(-1)^k 3^{k-1}}{k!}$ (d) $\displaystyle\sum_{n=1}^{\infty} \frac{200n}{2n^3-1}$

2. Which series provides the best comparison to use with the comparison test for $\displaystyle\sum_{k=1}^{\infty} \frac{\sqrt{k+1}}{k^2+1}$?

(a) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{\sqrt{k}}$ (b) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{k^{3/2}}$ (c) $\displaystyle\sum_{k=1}^{\infty} \frac{\sqrt{2k}}{k^2}$

3. Which series provides the best comparison to use with the comparison test for $\displaystyle\sum_{k=1}^{\infty} \frac{\ln k}{k^2}$?

(a) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{k}$ (b) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{k^{3/2}}$ (c) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{k^2}$

4. For each of the following situations, decide whether $\displaystyle\sum_{k=1}^{\infty} c_n$ converges, diverges, or if more information is needed.

(a) $0 \le c_n \le \dfrac{1}{n}$ for all n. (b) $\dfrac{1}{n} \le c_n$ for all n. (c) $0 \le c_n \le \dfrac{1}{n^2}$ for all n.

(d) $\dfrac{1}{n^2} \le c_n$ for all n. (e) $\dfrac{1}{n^2} \le c_n \le \dfrac{1}{n}$ for all n.

5. Does the series $\displaystyle\sum_{n=1}^{\infty} \frac{n}{1.05^n} = 0.95 + 1.81 + 2.59 + 3.29 + \cdots$ converge or diverge? (Explain).

9.5

1. Which series has the smallest radius of convergence?

(a) $\sum_{n=0}^{\infty} \frac{(x-10)^n}{6n+1}$ (b) $\sum_{n=0}^{\infty} \frac{(x-10)^n}{n+7}$ (c) $\sum_{n=0}^{\infty} \frac{2^n(x-10)^n}{n+1}$ (d) $\sum_{n=0}^{\infty} \frac{(x-10)^n}{\sqrt{n+1}}$

2. Determine the general term for the series below (start with $n = 1$).

$$(x-1) - \frac{(x-1)^2}{2} + \frac{(x-1)^3}{4} - \frac{(x-1)^4}{8} + \frac{(x-1)^5}{16} - \cdots$$

3. Determine the general term for the series below (start with $n = 1$).

$$\frac{x^2}{2} + \frac{x^4}{4} + \frac{x^6}{6} + \frac{x^8}{24} + \frac{x^{10}}{120} + \cdots$$

4. Determine the general term for the series below (start with $n = 1$).

$$\frac{1}{2} + x + \frac{5x^2}{4} + \frac{7x^3}{5} + \frac{9x^4}{6} + \cdots$$