

Name: _____

Solve the following problems.

1. Determine whether the following series converge. If the series depends on x , determine for which values of x it converges:

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

(b) $\sum_{n=1}^{\infty} \frac{e^n}{n^3}$

(c) $\sum_{n=3}^{\infty} \frac{1}{n^3+n-1}$

(d) $\sum_{n=1}^{\infty} \left(\frac{n^3}{n!}\right)^n$

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

(f) $\sum_{n=2}^{\infty} \frac{1}{n \ln(n)}$

(g) $\sum_{n=1}^{\infty} e^{-(\ln(n))^2}$ (Hints: $a^{bc} = (a^b)^c$ and $e^{-\ln(n)} = \frac{1}{n}$)

2. Determine whether the following series converge. If the series depends on x , determine for which values of x it converges.

(a) $\sum_{n=0}^{\infty} e^{-nx}$

(b) $\sum_{n=1}^{\infty} \frac{1}{n^6 + 5n}$

(c) $\sum_{n=1}^{\infty} \frac{n!}{e^n}$

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

(e) $\sum_{n=1}^{\infty} \left(1 - \frac{1}{n}\right)^n$

3. Determine whether the following series converge. If the series depends on x , determine for which values of x it converges.

(a) $\sum_{k=2}^{\infty} \frac{1}{k^2 - k}$

(b) $\sum_{k=100}^{\infty} \frac{1}{k \ln(k) \ln(\ln(k))}$

(c) $\sum_{k=1}^{\infty} 2^{k \ln(x)}$