

1. Determine whether the following series converge or diverge. Make sure that you show your work.
(Continued on the next page.)

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

(c)
$$\sum_{n=1}^{\infty} \frac{3^n(n+1)!}{5^n n!}$$

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

(d)
$$\sum_{n=1}^{\infty} \frac{5^n}{n^2 + 9}$$

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

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

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

(h) $\frac{1}{1!} + \frac{1 \cdot 3}{2!} + \dots + \frac{1 \cdot 3 \cdot 5 \cdot \dots \cdot (2n-1)}{n!} + \dots$

2. For what values of $x > 0$ does the series $\sum_{n=1}^{\infty} \frac{3^n}{n x^n}$ converge or diverge? Justify your answer and make sure to check the special case(s).