

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

(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  $\sum_{n=1}^{\infty} \frac{3^n}{nx^n}$  converge or diverge? Justify your answer and make sure to check the special case(s).