

**The University of Calgary**  
**Department of Mathematics and Statistics**  
**MATH 349**  
**Handout # 3**

1. Is the series  $\sum_{n=3}^{\infty} \frac{(-1)^n}{n(\ln n)}$

- (a) absolutely convergent or divergent? Explain.
- (b) conditionally convergent ?Explain.

2. Is the series  $\sum_{n=1}^{\infty} \frac{(-1)^n}{\ln(n+1)}$

- (a) absolutely convergent or divergent? Explain.
- (b) conditionally convergent ?Explain.

3. Is the series  $\sum_{n=2}^{\infty} (-1)^n \left(\frac{1}{n} - \frac{1}{n!}\right)$

- (a) absolutely convergent or divergent? Explain.
- (b) conditionally convergent ?

4. Find the centre,radius and interval of convergence of power series

(a)  $\sum_{n=1}^{\infty} \frac{n!}{4^n} (x+1)^n$

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

5. Express  $f(x) = \frac{1}{(x+1)^2}$  in powers of  $(x-1)$

On what interval is the representation valid?

6. Find the centre,radius and interval of convergence of power series

(a)  $\sum_{n=1}^{\infty} \frac{(4x-1)^n}{n^n}$

(b)  $\sum_{n=1}^{\infty} \frac{n}{2^n} (4-x)^n$

7. Express  $f(x) = \ln(2-x)$  in powers of  $(x+1)$ .

On what interval is the representation valid?

8. Expand  $g(x) = \frac{1}{1-2x}$  in powers of  $(x+4)$ ,

find the formula for  $n$ th term, and find the interval where the expansion is valid.