1. For each of the following series, determine whether they converge absolutely, converge conditionally, or diverge. You must state which test(s) you are using, and show that you have checked all appropriate conditions.

(a) \[ \sum_{n=1}^{\infty} \frac{5 - 2n + 6n^2}{\sqrt{5n^8 + n^6 + 7}} \]

(b) \[ \sum_{n=2}^{\infty} \frac{(-1)^n}{n^2 \ln n} \]

(c) \[ \sum_{n=1}^{\infty} \frac{(-1)^n(3n)!}{(2n)!n!} \]
(d) $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$

(e) $\sum_{n=1}^{\infty} \left(\frac{1 - 3n}{5n + 1}\right)^n$

(f) $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$

(g) $\sum_{n=1}^{\infty} (-1)^n \frac{n}{2n + (0.5)^n}$
2. Use a geometric series to write 2.74 74 74 ⋯ as a rational number.

3. Find the centre, radius of convergence and interval of convergence for the power series \( \sum_{n=0}^{\infty} \frac{(3 - 2x)^n}{4^n + 1} \).

4. (a) Write the Maclaurin series for \( \cos x \).

   (b) Use your series above to write a simplified power series for \( \cos \sqrt{x} \).
(c) Use your power series to write \( \int_0^1 \cos \sqrt{x} \, dx \) as a series.

5. Suppose that \( f(x) = \sum_{n=0}^{\infty} \frac{2 - \sin^2 n!}{4^n} (x - 2)^n \).

Find \( f(2) \), \( f'(2) \) and \( f^{(13)}(2) \).

6. Find the first 3 non-zero terms of the Maclaurin expansion for \( g(x) = \ln(1 + x) + e^x \).