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 Bachelor of Information Technology
 BSM 102
 Exercise on Infinite Series

1. Find the sum of the series $\sum_{n=0}^{\infty} x^n$, where $|x| < 1$
2. Consider the series $\sum_{n=0}^{\infty} \frac{n}{(n+1)!}$
 - (a) Find the partial sums s_1, s_2, s_3, s_4 . Do you recognize the denominators? Use the patterns to guess a formula for s_n
 - b) Show that the given infinite series is convergent and find its sum.
3. Determine whether the series is convergent or divergent. If it is convergent, find its sum.
 - (a) $\sum_{n=1}^{\infty} \frac{3^n + 2^n}{6^n}$
 - (b) $\sum_{n=1}^{\infty} \frac{1}{2^{n-1}} - \frac{2}{3^{n-1}}$
 - (c) $\sum_{n=1}^{\infty} 3^{-n} 8^{n+1}$
 - (d) $\sum_{n=1}^{\infty} \frac{-3^{n-1}}{4^n}$
 - (e) $\sum_{n=1}^{\infty} \frac{1}{4n^2 - 1}$
 - (f) $\sum_{n=1}^{\infty} \frac{1}{e^{2n}}$
4. Determine if the following series is convergent or divergent.
 - a) $\sum_{n=0}^{\infty} \frac{n+2}{2n+7}$
 - b) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n^2 + 1}$
 - c) $\sum_{n=1}^{\infty} \frac{9^n}{(-2)^{n+1} n}$
 - d) $\sum_{n=0}^{\infty} \frac{(\pi + \pi i)^{2n+1}}{(2n+1)!}$
 - e) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{2n}}$
 - f) $\sum_{n=0}^{\infty} \frac{(-1)^n (1+i)^{2n}}{(2n)!}$
 - g) $\sum_{n=1}^{\infty} \frac{(3i)^n n!}{n^n}$
 - h) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$
 - i) $\sum_{n=0}^{\infty} \frac{n+i}{3n^2 + 2i}$
 - j) $\sum_{n=0}^{\infty} \frac{(20 + 30i)^n}{n!}$
 - k) $\sum_{n=2}^{\infty} \frac{(-i)^n}{\ln n}$
 - l) $\sum_{n=1}^{\infty} n^2 \left(\frac{1}{4}\right)^n$
 - m) $\sum_{n=0}^{\infty} \frac{i^n}{n^2 - i}$
 - n) $\sum_{n=1}^{\infty} \left(\frac{n-1}{2n+3}\right)^n$
 - o) $\sum_{n=1}^{\infty} \left(\frac{2n^2 - 1}{n^2 + 3}\right)^n$
 - p) $\sum_{n=1}^{\infty} \frac{(\ln n)^{2n}}{n^n}$
 - q) $\sum_{n=1}^{\infty} \frac{n}{2^n}$

5. Find the center, radius and interval of convergence of the power series

(a) $\sum_{n=1}^{\infty} 2^n (z-1)^n$

(b) $\sum_{n=1}^{\infty} \frac{(z-2i)^n}{5^n}$

(c) $\sum_{n=1}^{\infty} \frac{(z-2i)^n}{n^n}$

(d) $\sum_{n=1}^{\infty} \frac{(-1)^n n}{8^n} z^n$

(e) $\sum_{n=1}^{\infty} \frac{n^n}{n!} (z-\pi i)^n$

(f) $\sum_{n=1}^{\infty} \frac{(z-2i)^n}{n^n}$

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

(h) $\sum_{n=0}^{\infty} \frac{n(n-1)}{2^n} (z+i)^{2n}$