(1) (a) Assume that the function \( \cos(x) \) can be written as a power series with \( \infty \) as the radius of convergence. Find the power series (using Taylor polynomials).

(b) Assume that for all \( x \),
\[
\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots + (-1)^n \frac{x^{2n+1}}{(2n+1)!} + \cdots
\]
Use this to check your answer to part a.

(2) For each of the following polynomials, find an equivalent polynomial in powers of \((x - a)\).
Express the polynomial:
[Remark: Here we are changing where the polynomial is centered about.]

(a) \(3x^3 - 2x^2 + 4x + 1\) in powers of \((x - 1)\).
(b) \(2x^5 + x^2 - 3x - 5\) in powers of \((x + 1)\).
(c) \(x^4 - x^3 + x^2 - x + 1\) in powers of \((x - 2)\).
(3) Assume that the function $f(x) = (1 + 2x)^{-4}$ can be expressed as a power series in powers of $(x - 4)$. Use the theorem that says $a_n = \frac{f^{(n)}(a)}{n!}$ to find the power series.