(1) Consider \( f(x) = \sqrt[4]{x} \). Find the Taylor polynomials of orders 1 and 2 (i.e. \( p_1(x) \) and \( p_2(x) \)) for \( f \) centered at \( a = 16 \). Use \( p_1 \) to approximate \( \sqrt[4]{15} \). Use \( p_2 \) to get a better approximation to \( \sqrt[4]{15} \).
(2) The function

\[ f(x) = \frac{e^x - (1 + x)}{x^2} \]

is not defined at \( x = 0 \). Use the Taylor polynomial of degree four centered at zero to approximate \( e^x \), and use this to find a natural way to define \( f(0) \). Compare this value of \( f(0) \) to the limit, \( \lim_{x \to 0} f(x) \), obtained using L'Hopital’s rule.
(3) Use Taylor’s theorem to find the $n^{th}$ degree Taylor polynomial $p_n(x)$ with the remainder $R_n(x)$ for the function

$$f(x) = \frac{1}{2 - x}$$

centered at $a = 1$. 