§7.1, 7: Derive the following two formulas for approximating the third derivative. Find their error terms. Which formula is more accurate?

\[ f'''(x) \approx \frac{1}{h^3} [f(x + 3h) - 3f(x + 2h) + 3f(x + h) - f(x)] \]
\[ f'''(x) \approx \frac{1}{2h^3} [f(x + 2h) - 2f(x + h) + 2f(x - h) - f(x - 2h)] \]

§7.1, 14: Using Taylor series, derive the error term for the approximation

\[ f'(x) \approx \frac{1}{2h} [-3f(x) + 4f(x + h) - f(x + 2h)] \]

§7.1, 15: Derive a numerical differentiation formula of order \(O(h^4)\) by applying Richardson extrapolation to

\[ f'(x) \approx \frac{1}{2h} [f(x + h) - f(x - h)] - \frac{h^2}{6} f''(x) - \frac{h^4}{120} f^{(5)}(x) \]

§7.1, 17: Establish a formula of the form

\[ f''_n \approx \frac{1}{h^2} [Af_{n+3} + Bf_{n+2} + Cf_{n+1} + Df_n] \]

Here \(f_{n+i} = f(x_n + ih)\).