The second order Maclaurin polynomial \((x_0 = 0)\) for \(f(x) = \frac{1}{1-x}\) is

\[ P_2(x) = 1 + x + x^2. \]

A. Calculate \(|f^{(3)}(x)|\).

B. If \(I = [-1,0]\), find an upper bound \(K_3\) for \(|f^{(3)}(x)|\) on \(I\).

C. Taylor’s Theorem says that \(|f(x) - P_2(x)| \leq \frac{K_3}{3!} |x - x_0|^3\) for all values of \(x\) in an interval \(I\) containing \(x_0\). Calculate the maximum approximate error for values of \(x\) in \(I\), i.e. the maximum value of \(\frac{K_3}{3!} |x - x_0|^3\) on \(I\).

D. If you use \(P_2(x)\) to approximate \(f(x)\) on \(I\), what is the maximum actual error on \(I\)?