2. (Taylor polynomials)

(a) Write down the Taylor polynomials $P_n(x)$ of degree $n = 0, 1, 2, 3$ for the function $f(x) = \ln x$ about the point $x = 1$.

(b) Plot the polynomials $P_n(x)$ and the function $f(x)$ on the interval $[0, 3]$ using Matlab. Describe how the error $|f(x) - P_n(x)|$ behaves with respect to the point x and the degree n.

(We can use any plotting program here...)