

Calculate the five Chebyshev nodes in the interval $[-1, 1]$ which are used when interpolating with a degree four polynomial. Evaluate the function $f(x) = 2 \arcsin(x)$ ($= 2 \sin^{-1}(x)$) at each of these points. Construct the degree four Chebyshev polynomial

$$c_0T_0(x) + c_1T_1(x) + c_2T_2(x) + c_3T_3(x) + c_4T_4(x)$$

for this data, where $T_n(x)$ denotes the n^{th} Chebyshev polynomial. Evaluate the resulting polynomial at $x = 0.8$ and compare with the actual value $\arcsin(0.8)$. (Use 3 significant digits throughout problem 3.)