

Mh4718 Worksheet 7

1. Let $P(x) = x^5 - 6x^4 + 8x^3 + 8x^2 + 4x - 40$.
Let $Q(x)$ be the unique polynomial such that

$$P(x) = Q(x)(x - 3) + P(3).$$

Use Horner's method to determine $P(3)$ and $Q(x)$.

By differentiating the equation $P(x) = Q(x)(x - 3) + P(3)$ show that

$$P'(3) = Q(3).$$

2. Let $P(x) = x^5 - 6x^4 + 8x^3 + 8x^2 + 4x - 40$.
Write a C++ program which uses Horner's method to determine $P(3)$. Bring your program to the next lab session on a USB key or by email.
3. Determine the Taylor polynomial of degree 10 around 0 for $\cos(x)$.
4. Determine the Taylor polynomial of degree 6 around 0 for the function $(1+x)^{\frac{3}{2}}$.
5. (i) Write a C++ program which defines a function which returns the value of the Taylor polynomial of degree 20 around 0 for the function e^x . Get the program to evaluate this polynomial in the "natural" way. Get your program to compare the value of this polynomial with the library function $\exp(x)$ for different values of x .
(ii) Do the same for the function $\cos(x)$.
6. (i) Write a C++ program which defines a function which returns the value of the Taylor polynomial of degree 20 around 0 for the function e^x . Get the program to evaluate this polynomial using Horner's method. Get your program to compare the value of this polynomial with the library function $\exp(x)$ for different values of and x .
(ii) Do the same for the function $\cos(x)$.