Example 8-1: Comparing numerical and analytical differentiation

Consider the function . Calculate the first derivative at point x=3 numerically with the forward, backward and central finite difference formulas and using:

a) Points x=2, x=3, x=4.

b) Points x=2.75, x=3, x=3.25

a)

|  |  |  |  |
| --- | --- | --- | --- |
| **x** | 2 | 3 | 4 |
| **f(x)** | 8 | 27 | 64 |

Forward finite difference:

Backward finite difference:

Central finite difference: