Worksheet 2/20/2026

1) From the table

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

Compute approximately $y'(1.6)$ and $y''(1.6)$.

(a) Using Newton's forward divided difference at order $O(h)$.

(b) Using Newton's forward divided difference at order $O(h^2)$.

(c) Using Newton's backward divided difference at order $O(h^2)$.

(d) Using Newton's central divided difference at order $O(h^2)$.

2) Suppose $x_0, x_1, x_2, \ldots$ are equally spaced points on the real line with $x_{k+1} - x_k = h$ for all k. A function f is defined on the real line with $f(x_k) = y_k$.

(a) Approximate $f'(x_k)$ at order $O(h)$ using Newton's forward divided difference.

(b) Approximate $f''(x_k)$ at order $O(h^2)$ using Newton's forward divided difference.

(c) Approximate $f'(x_k)$ at order $O(h^2)$ using Newton's backward divided difference.

(d) Approximate $f'(x_k)$ at order $O(h^2)$ using Newton's central divided difference.