**EML3041 Computational Methods**

**Fall 2023**

**Week Seven: October 2 – October 6**

Answer the free-response questions on a fresh sheet of paper. *Solve the problem as if you were submitting them for a test.* Submit #1 at end of class.

1) The following data of the velocity of a body is given as a function of time

| **Time (s)** | 0 | 10 | 15 | 22 | 25 |
|---|---|---|---|---|---|
| **Velocity(m/s)** | 12 | 19 | 27 | 33 | 49 |

One of the interpolant approximations from the above data is given as

$$v(t) = 161.857 - 15.7048t + 0.4476t^2, 15 \leq t \leq 25$$

a) Using the above interpolant, estimate the velocity of the body at $t = 17.4$ s.

b) Using the above interpolant, estimate the acceleration in m/s$^2$ at $t = 17.4$ s.

c) Using the above interpolant, estimate the displacement of the body between $t = 16.1\ s$ and $t = 22.1\ s$.

Answer: a) b) $-0.1283$ m/s$^2$ c) $159.2068$ m.

2) The following $(x, y)$ data is given:

| $x$ | 15 | 18 | 22 |
|---|---|---|---|
| $y$ | 24 | 35 | 25 |

A first-order polynomial is chosen as an interpolant for the first two data points as

$$y = a + b(x - 15), 15 \leq x \leq 18, \text{ Find the value of } b.$$

Answer: $3.6667$