

1.

| Degree | Points Used                | Approximation | Absolute Error | Error Bound |
|--------|----------------------------|---------------|----------------|-------------|
| 1      | 0.733, 0.768               | 0.731591      | 0.000109       | 0.000153    |
| 1      | 0.733, 0.803               | 0.731397      | 0.000303       | 0.000451    |
| 1      | 0.768, 0.803               | 0.732003      | 0.000303       | 0.000477    |
| 1      | 0.698, 0.768               | 0.731334      | 0.000366       | 0.000468    |
| 1      | 0.698, 0.733               | 0.732077      | 0.000377       | 0.000442    |
| 1      | 0.698, 0.803               | 0.730690      | 0.001010       | 0.001378    |
| 2      | 0.733, 0.768, 0.803        | 0.731691      | 0.000009       | 0.000003    |
| 2      | 0.698, 0.733, 0.768        | 0.731716      | 0.000016       | 0.000003    |
| 2      | 0.698, 0.768, 0.803        | 0.731665      | 0.000035       | 0.000008    |
| 2      | 0.698, 0.733, 0.803        | 0.731740      | 0.000040       | 0.000008    |
| 3      | 0.698, 0.733, 0.768, 0.803 | 0.731704      | 0.000004       | 0.000000    |

PS C:\Users\凌芷婕\OneDrive\桌面\.venv\C44101175\_numerical\_hw3>

2.

$$y = x - e^x$$

|                        |                        |                        |                        |
|------------------------|------------------------|------------------------|------------------------|
| $x_0 = 0.3$            | $x_1 = 0.4$            | $x_2 = 0.5$            | $x_3 = 0.6$            |
| $y_0 = 0.3 - 0.740818$ | $y_1 = 0.4 - 0.670320$ | $y_2 = 0.5 - 0.606531$ | $y_3 = 0.6 - 0.548812$ |
| $= -0.440818$          | $= -0.270320$          | $= -0.106531$          | $= 0.051188$           |

$$y=0, x = \frac{(y-y_1)(y-y_2)(y-y_3)}{(y_0-y_1)(y_0-y_2)(y_0-y_3)} x_0 + \frac{(y-y_0)(y-y_2)(y-y_3)}{(y_1-y_0)(y_1-y_2)(y_1-y_3)} x_1$$

$$+ \frac{(y-y_0)(y-y_1)(y-y_3)}{(y_2-y_0)(y_2-y_1)(y_2-y_3)} x_2 + \frac{(y-y_0)(y-y_1)(y-y_2)}{(y_3-y_0)(y_3-y_1)(y_3-y_2)} x_3 = 0.567143$$

3.

|        | 位置@t=10 (ft) | 速度@t=10 (ft/s) | 第一次超速時間 (s) | 最大速度 (ft/s) |
|--------|--------------|----------------|-------------|-------------|
| 使用全部5點 | 596.316006   | -100.717641    | 0.039039    | 398.197417  |
| 使用後4點  | 727.870365   | 42.365507      | 3.070070    | 125.204862  |
| 使用後3點  | 762.223958   | 71.406944      | 5.056056    | 85.636907   |