Optional Exam 2

Kathryn Atherton

ABE 30100

March 27, 2019

For a heat transfer process, TAOCO’s equipment contains a temperature sensor to control the temperature of the process which outputs the following data.

|  |  |
| --- | --- |
| Time [s] | Temperature [oC] |
| 0 | 25 |
| 200 | 196 |
| 400 | 396 |
| 600 | 511 |
| 800 | 551 |
| 1000 | 551 |
| 1200 | 538 |
| 1400 | 533 |
| 1600 | 529 |
| 1800 | 520 |
| 2000 | 516 |
| 2200 | 516 |
| 2400 | 511 |
| 2600 | 511 |
| 2800 | 507 |
| 3000 | 507 |
| 3200 | 502 |
| 3400 | 498 |

1. Make a cubic spline to model the temperature of the system over time.
2. Using your cubic spline model, find the time in seconds at which the temperature of the system is at a maximum.
3. Calculate the temperature of the product at the time at which the temperature of the system is at its maximum using the equations and constants given below.
   * k = 0.58 W/m.K
   * A = 1 m2
   * d = 0.1 m
   * T1, t = 0 = 25 oC
   * m = 1 kg
   * cp = 1.67 kJ/kg.K