

6 Further Graphics (pb355)

- (a) Consider the b-spline curve $P(t)$ with knot vector $[0, 1, 2, 3, 3, 3]$ and $k = 3$.
- (i) In a single sentence, explain the effect on $P(t)$ of repeating a knot value k times. [1 mark]
 - (ii) State the equations that define $P(t)$. [3 marks]
 - (iii) State the equation and sketch the graph for each of the three quadratic basis functions $N_{i,3}(t)$ of $P(t)$. [8 marks]
 - (iv) Plot the path of $P(t)$ for control points $P_0 = (0, 0)$, $P_1 = (4, 0)$, $P_2 = (4, 4)$. [4 marks]
- (b) Consider an embedded closed manifold surface with 48 vertices, 48 faces, and 100 edges.
- (i) What is the genus of this surface, and what is the formula to find it? [2 marks]
 - (ii) What is the total angle deficit of this surface, and what is the formula to find it? [2 marks]