## COMPUTER SCIENCE TRIPOS Part IB 75\%, Part II 50\% - 2020 - Paper 7

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.
(ii) State the equations that define $P(t)$.
(iii) State the equation and sketch the graph for each of the three quadratic basis functions $N_{i, 3}(t)$ of $P(t)$.
(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]

