Graphs and networks

Answers

Further Maths topic practice

This topic online

Q	Answer	Marks
1	**a)** A 2, B 3, C 3, D 2, E 4, F 2 **b)** 16 = 2 × 8; each edge adds 2 to the total degree	3
2	**a)** e.g. P U T S or P Q R S **b)** e.g. Q R T U Q **c)** e.g. P Q R S T U P	3
3	**a)** n(n - 1) ends ÷ 2 **b)** 21 **c)** 6	4
4	**a)** 0 2 1 0 0; 2 0 1 1 0; 1 1 0 1 0; 0 1 1 0 1; 0 0 0 1 0 **b)** row sum; deg(B) = 4 **c)** it has a multiple edge (A to B twice)	4
5	**a)** AB 12, AC 9, AE 15, BC 7, BD 10, CD 8, CE 11, DE 6 **b)** 78 km **c)** A 3, B 3, C 4, D 3, E 3	4
6	**a)** Graph 1 neither, Graph 2 semi-Eulerian, Graph 3 Eulerian **b)** A to B, e.g. A E B A D C B	5
7	**a)** sum 19 is odd **b)** 6 **c)** 3 **d)** neither: 6 odd vertices **e)** a tree has vertices of degree 1 (odd)	6
8	**a)** A-P, B-R, C-T, D-Q, E-S, F-U **b)** I has a 3-cycle, G does not	5
9	**a)** G has degree 1 **b)** A B C G D E F A **c)** neither: odd vertices B, C, D, F	5
10	**a)** 8.3 km **b)** exactly two odd vertices, L and W **c)** L to W, e.g. L C B W T M L W **d)** LW, 7 km	7
11	**a)** 5 edges, remove 4 **b)** AB, AC, AD, AE, AF **c)** BC, CD, DE, EF, FA **d)** degree sum must be 10 but would be at most 6	6
12	**a)** degree n - 1: even for odd n; n even gives n odd vertices **b)** 4 edges, no two sharing a vertex **c)** 24 **d)** e.g. 1 3 5 7 2 4 6 8 1	8

Full worked solutions, written out by hand, are on the solutions sheet for this topic.

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