MAT 118, Chapter 6 Sample Questions, Exam on Monday, November 4

(1) ☐ This Irish mathematician lived from 1805 to 1865, became Astronomer Royal of Ireland at age 21 and his name is used to denote a path in a graph that visits every vertex exactly once.
(a) Rene Descarte
(b) Johann Bernoulli
(c) William Hamilton
(d) Leonard Euler
(e) Fredrich Gauss
(f) none of these

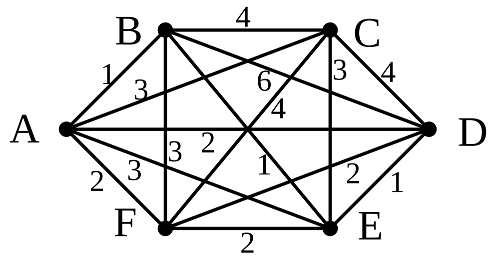
(2) ☐ This Stony Brook professor was awarded the 2010 Godel prize for inventing a fast, approximate algorithm for the traveling salesman problem.
(a) Dennis Sullivan
(b) Joe Mitchell
(c) Jack Milnor
(d) James Glimm
(e) Jim Simons

(3) ☐ In a complete graph with four vertices labeled A, B, C and D, how many Hamiltonian paths start at A and end at B?
(a) 0
(b) 1
(c) 2
(d) 6
(e) 24
(f) none of these

(4) ☐ Suppose there are n vertices. Start by taking the two edges of least weight. For edges $3, \ldots, n-1$ take the edge of least weight that does not create three edges at one vertex and does not form a closed circuit. The last edge is taken so as to form a closed circuit. This algorithm for the traveling salesman problem is called the
(a) lowest weight algorithm
(b) nearest neighbor algorithm
(c) farthest insertion algorithm
(d) cheapest link algorithm
(e) exhaustive search algorithm
(f) none of these

(5) Use the nearest neighbor algorithm starting at vertex D. What circuit do you find?

(a) D, E, B, A, F, C, D
(b) D, B, F, E, C, A, D
(c) D, F, C, A, B, E, D
(d) D, E, A, F, B, C, D
(e) D, B, E, A, F, C, D
(f) none of these



(6) What is the cost of the circuit found by the cheapest link algorithm using data in this table?

(a) 2600
(b) 2000
(c) 2800
(d) 3100
(e) 2400
(f) none of these

	A	B	C	D	E	F
A	*	350	700	1000	1100	550
B	350	*	600	450	900	700
C	700	600	*	300	500	200
D	1000	450	300	*	100	500
E	1100	900	500	100	*	400
F	550	700	200	500	400	*

(7) Apply the brute force algorithm to the graph below. A table is provided giving all the circuits starting at A. What is the length of the optimal path?

circuit	cost
ABCDA	
ABDCA	
ACDBA	
ACBDA	
ADBCA	
ADCBA	

	A	B	C	D
A	-	6	4	15
B	6	-	3	4
C	4	3	-	7
D	15	4	7	-

(a) 18 **(b)** 19 **(c)** 20 **(d)** 21 **(e)** 22 **(f)** 31

(8) Which statement is true about the graph on the right?

(a) There is a Hamilton circuit.
(b) There is a Hamilton path starting anywhere.
(c) There is no Hamilton path.
(d) There is a Hamilton path starting and ending at black dots.
(e) There is a Hamilton path starting and ending at white dots.