Quiz on Section 1 Results for SevdanurGenc

Correct answers are hidden.

Score for this attempt: **9.5** out of 12

Submitted Jun 17 at 10:54pm

This attempt took 36 minutes.

Question 1

1 / 1 pts

Given that $x_1 + x_2 + x_3 + x_4 + x_5 \leq 5$ should hold, select the penalty term corresponding to this constraint.

- (x_1+x_2+x_3+x_4+x_5-s -5)^2 = 0 where s is a non-negative slack variable.
- (x_1+x_2+x_3+x_4+x_5+s -5)^2 = 0 where s is a non-negative slack variable.
- (x_1+x_2+x_3+x_4+x_5-5)^2
- (x_1+x_2+x_3+x_4+x_5+5)^2 = 0 where s is a non-negative slack variable.

Partial

Question 2

0.5 / 1 pts

Select the penalty terms that correspond to the constraint $x = y$.

- [ ] xy-x-y
- [ ] xy
- [x] $x+y-2xy$
- [ ] (x-y)^2

Question 3

1 / 1 pts

What is the objective value we can obtain for a feasible solution of the graph coloring problem?

- 10
- (selected) 0
- Not enough information
- -5

Question 4

1 / 1 pts

Suppose that Q is the QUBO matrix representing a graph coloring problem with two nodes and two colors.

$$Q = \begin{pmatrix} -1 & 2 & 1 & 0 & 1 & 0 \\ 0 & -1 & 0 & 1 & 0 & 1 \\ 0 & 0 & -1 & 2 & 1 & 0 \\ 0 & 0 & 0 & -1 & 0 & 1 \\ 0 & 0 & 0 & 0 & -1 & 2 \\ 0 & 0 & 0 & 0 & 0 & -1 \end{pmatrix}$$

Find out if the vector $x = (0, 1, 1, 1, 0, 1)$provides a feasible solution to the graph coloring problem or not.

- The vector provides a feasible solution.
- (selected) The vector provides an infeasible solution.

Question 5

1 / 1 pts

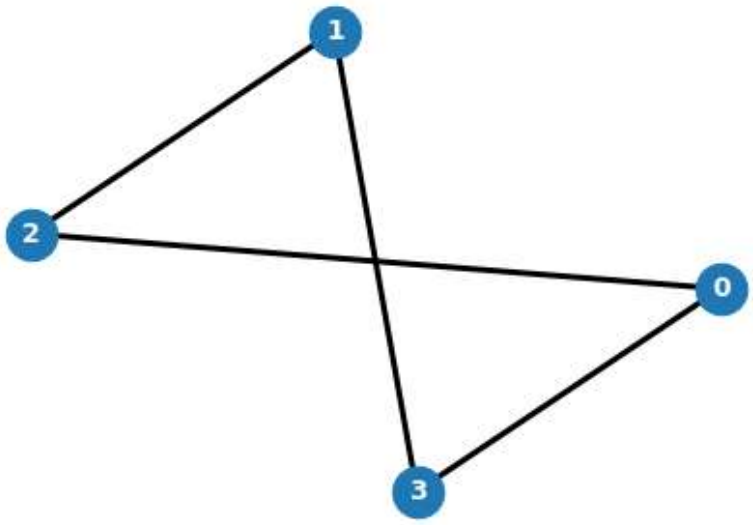
A path through a graph that visits each vertex exactly once is called a Hamiltonian path.

- (•) True
- ( ) False

Question 6

1 / 1 pts

What is the size of the maximum cut of the following graph?



- ( ) 3
- (•) 4
- ( ) 2
- ( ) 1

Question 7

1 / 1 pts

Find the linear coefficients in the following QUBO matrix

$$\begin{bmatrix} 1 & 4 & 8 & 0 \\ 0 & 3 & 2 & 0 \\ 0 & 0 & 9 & 10 \\ 0 & 0 & 0 & 2 \end{bmatrix}$$

- 4, 8, 2, 10
- 0, 3, 2, 0
- 1, 3, 9, 2
- 1, 4, 8, 0

Question 8

1 / 1 pts

Find the right QUBO matrix representation for the following objective function

$f(x_1, x_2, x_3) = -10x_1 - 2x_2 + 5x_3 + 3x_1x_2 + x_1x_3 + 2x_2x_3$

- $\begin{bmatrix} -10 & 3 & 1 \\ 0 & -2 & 2 \\ 0 & 0 & 10 \end{bmatrix}$
- $\begin{bmatrix} -5 & 4 & 8 \\ 0 & -3 & 2 \\ 0 & 0 & -8 \end{bmatrix}$
- $\begin{bmatrix} -10 & 3 & 1 \\ 0 & -2 & 2 \\ 0 & 0 & 5 \end{bmatrix}$

- $\begin{bmatrix} -1 & 3 & 1 \\ 0 & 0 & 2 \\ 0 & 0 & 5 \end{bmatrix}$

Question 9

1 / 1 pts

The objective function of the max-cut problem is

$\min \sum_{(i,j)\in E} x_i + x_j - 2x_i x_j$

- True
- False

Question 10

1 / 1 pts

Find the vector x that provides a maximum cut for the problem defined by the following matrix

$$Q = \begin{pmatrix} 10 & 2 & 2 & 0 & 0 \\ 0 & -8 & 0 & 11 & 0 \\ 0 & 0 & -3 & 2 & 2 \\ 0 & 0 & 0 & -3 & 2 \\ 0 & 0 & 0 & 0 & -2 \end{pmatrix}$$

- $x = (0, 1, 1, 0, 1)$
- $x = (1, 0, 0, 0, 1)$
- $x = (0, 1, 1, 0, 0)$
- $x = (1, 1, 1, 0, 1)$

Incorrect

Question 11

0 / 1 pts

Let $x_{i,t}$ be a binary variable which is equal to 1 if node i is visited at time t, and 0 otherwise.

Suppose that the solution to a TSP problem instance with 5 cities is found as follows: (Only those variables which are equal to 1 are listed.)

$x_{0,4} = 1,\ x_{1,3} = 1,\ x_{2,2} = 1,\ x_{3,0} = 1,\ x_{4,1} = 1$

Identify the corresponding route.

- 1-0-2-3-4-1
- 0-1-2-3-4-0
- 4-3-2-0-1-4
- 3-4-2-1-0-3

Incorrect

Question 12

0 / 1 pts

Let $x_{i,t}$ be a binary variable which is equal to 1 if node i is visited at time t, and 0 otherwise. Suppose we have a TSP instance with 6 cities.

What does the constraint $\sum_{t=0}^{5} x_{i,t} = 1,\ i = 0, 1, \ldots 5$ signify?

- At each time point exactly one city is visited.
- Each node is visited exactly once.
- Each node is visited at most once.
- At least one city is visited at each time point.

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