Quiz on Section 1 Results for SevdanurGenc

Correct answers are hidden.

Score for this attempt: **10** out of 12

Submitted Jun 17 at 11:05pm

This attempt took 10 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+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-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.

Question 2

1 / 1 pts

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

- xy
- $x+y-2xy$
- xy-x-y
- (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?

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

Question 4

1 / 1 pts

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

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

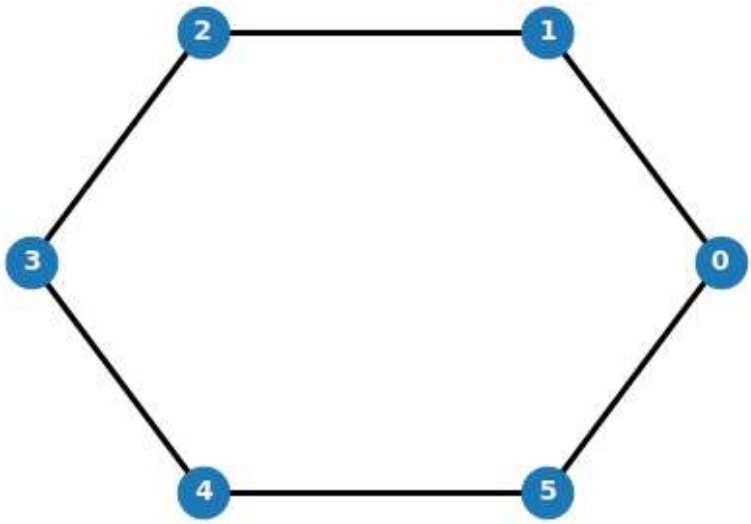
Find out if the vector $x = (0, 1, 1, 1, 0, 1)$provides a feasible solution to the graph coloring problem or not.

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

Question 5

1 / 1 pts

What is the chromatic number of the following graph?



- 1
- 2
- 4
- 3

Question 6

1 / 1 pts

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

- True
- False

Question 7

1 / 1 pts

Find the linear coefficients in the following QUBO matrix

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

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

Question 8

1 / 1 pts

Variables in a QUBO problem must always be

- Continuous
- Binary
- Integer

Question 9

1 / 1 pts

Determine the size of the cut given by $x = (0, 0, 1, 1, 0)$for the problem defined by the following matrix

$$Q = \begin{pmatrix} 8 & 2 & 2 & 0 & 0 \\ 0 & -1 & 0 & 11 & 0 \\ 0 & 0 & -3 & 2 & 2 \\ 0 & 0 & 0 & -4 & 2 \\ 0 & 0 & 0 & 0 & -2 \end{pmatrix}$$

- 6
- 4
- 3
- 5

Question 10

1 / 1 pts

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

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

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

Incorrect

Question 11

0 / 1 pts

Suppose that Q is the QUBO matrix representing a TSP instance with 4 cities and the penalty coefficient is set to $P = 4$. Suppose for a given x, the value of $x^T Q x$ is-20. Which one of the followings can you conclude with certainty?

- [ ] Optimal route has cost 12.
- [x] The found route is optimal.
- [ ] The found route is feasible.
- [x] The cost of the found route is 12.
- [ ] Optimal solution has a cost less than or equal to 12.

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?

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

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