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Unit 26 - Week 8 Quiz

Week 8 Quiz

The due date for submitting this assignment has passed. Due on 2020-03-25, 23:59 IST.
As per our records you have not submitted this assignment.

All questions carry equal weightage. You may submit as many times as you like within the deadline. Your final submission will be graded.

1) When we model a graph problem using LP, mapping each path to a variable is not a good strategy because: ***2 points***

- We have to be careful to avoid cycles.
- A graph has exponentially many paths.
- Edges may be directed.
- Paths can be hard to compute.

No, the answer is incorrect.
Score: 0
Feedback:
Graphs have exponentially many paths, so the LP model will have exponentially many variables.
Accepted Answers:
A graph has exponentially many paths.

2) Which of the following is a linear constraint? ***2 points***

- $17x + 3xz \leq 4$
- $3x \geq 14y + 2z + 13$
- $7x \leq 3xy + 14z - 12$
- $5y + 3x^2 \geq 33$

No, the answer is incorrect.
Score: 0
Feedback:
In a non-linear constraint, we have two or more variables (same or different) multiplied together.
Accepted Answers:

3x ≥ 14y + 2z + 13

3) Suppose we compute the maximum s-t flow F in a network. Then, which of the following is true of s-t cuts? ***2 points***

- F gives a lower bound for the capacity of the minimum s-t cut but not the exact capacity.
- From F, we can identify all minimum s-t cuts in polynomial time.
- From F, we can identify a minimum s-t cut in polynomial time.
- From F, we know the capacity of the minimum s-t cut, but identifying such a cut can take exponential time.

No, the answer is incorrect.
Score: 0

Feedback:
From F, use BFS to identify saturated edges that form a min-cut. There may be other min-cuts.

Accepted Answers:
From F, we can identify a minimum s-t cut in polynomial time.

4) We wish to show that problem B is NP-complete. Which of the following facts is sufficient to establish this. ***2 points***

- There is a polynomial time reduction from B to SAT.
- There is a polynomial time reduction from SAT to B
- There is a polynomial time reduction from B to SAT, and B has a checking algorithm.
- There is a polynomial time reduction from SAT to B, and B has a checking algorithm.

No, the answer is incorrect.
Score: 0

Feedback:
We need a reduction from an NP-complete problem to B and evidence that B belongs to NP.

Accepted Answers:
There is a polynomial time reduction from SAT to B, and B has a checking algorithm.

5) We have constructed a polynomial time reduction from problem A to problem B. Which of the following is a valid inference? ***2 points***

- If the best algorithm for A takes exponential time, there is no polynomial time algorithm for B.
- If we have a polynomial time algorithm for A, we must also have a polynomial time algorithm for B.
- If we don't know whether there is a polynomial time algorithm for B, there cannot be a polynomial time algorithm for A.
- If the best algorithm for B takes exponential time, there is no polynomial time algorithm for A.

No, the answer is incorrect.
Score: 0

Feedback:
If we have a polynomial time solution for B, the reduction gives us a polynomial time solution for A.

Accepted Answers:
If the best algorithm for A takes exponential time, there is no polynomial time algorithm for B.

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