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Course outline

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Week 1 Quiz
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Week 2 :
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Thank you for taking the Week 4 Quiz.

Week 4 Quiz

Your last recorded submission was on 2025-02-10, 20:53 Due date: 2025-02-19, 23:59 IST.
IST

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

1) A regional airline serves 10 cities. It operates to-and-fro return flights between 9 **2 points** pairs of cities in such a way that every city is reachable from every other city through a sequence of connecting flights.

We know the fuel consumption for the direct flights between each pair of cities. We want to compute the minimum fuel consumption from a given city to every other city in the airline network. Which of the following is true for this specific situation?

- ☐ We can use BFS, DFS or Dijkstra's algorithm to compute this.
- ☐ We can use BFS or Dijkstra's algorithm to compute this, but not DFS.
- ☐ We can use DFS or Dijkstra's algorithm to compute this, but not BFS.
- ☒ We can only use Dijkstra's algorithm to compute this, not BFS or DFS.

2) An airline charges a fixed price for each direct flight. For each sequence of **2 points** hopping flights, the ticket price is the sum of the fares of the individual sectors.

TripGuru has precalculated the cheapest routes between all pairs of cities on this airline's route network so that it can offer an optimum choice instantly to customers visiting its website.

The government decides to impose a 3% luxury tax on each sector. Which of the following describes the impact of this surcharge on TripGuru's computation?

- ☐ There is no impact. Cheapest routes between all pairs of cities remains unchanged.
- ☐ The surcharge favours hopping flights with more sectors. TripGuru should recompute any cheapest route where there is a longer route in terms of number of flights.
- ☒ The surcharge favours hopping flights with fewer sectors. TripGuru should recompute any cheapest route where there is a shorter route in terms of number of flights.

Week 2 Quiz

()

**Week 2
Programmin
g
Assignment**
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**Week 3 :
Graphs ()**

Week 3 Quiz
()

**Week 3
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**Week 4 :
Weighted
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Week 4 Quiz
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**Quiz: Week 4
Quiz
(assessment?
name=222)**

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☐ The impact is unpredictable. TripGuru should recompute all cheapest routes.

3) An airline charges a fixed price for each direct flight. For each sequence of hopping flights, the ticket price is the sum of the fares of the individual sectors.

2 points

TripGuru has precalculated the cheapest routes between all pairs of cities on this airline's route network. A major IT company has its offices at all the locations served by the airline, and books all official trips for its employees via TripGuru. To simplify administrative processing, the IT company has selected a subset of the airline's routes so that all of their office locations are reachable from each other, and the total cost of travelling across all the chosen routes is minimum.

The airline has decided to become a full-service carrier and has included a meal on each sector. To account for this, the airline has added a flat "convenience fee" of Rs 300 on each sector. Which of the following describes the impact of this surcharge on the IT company's computation of which subset of routes to use?

- ☐ There is no impact. The IT company can retain the same subset of routes.
- ☐ The surcharge favours hopping flights with more sectors. The IT company should reconsider including routes where there may be a longer route, with more hops.
- ☒ The surcharge favours hopping flights with fewer sectors. The IT company should reconsider including routes where there may be a shorter route, with fewer hops.
- ☐ The effect of the surcharge is unpredictable. The IT company should recompute its preferred subset of routes afresh.

4) Suppose we have a weighted undirected graph with negative edge weights. Which of the following is correct? **2 points**

- ☐ Neither Kruskal's algorithm nor Prim's algorithm can be used to compute an MCST.
- ☐ Kruskal's algorithm will compute a valid MCST but Prim's algorithm will not.
- ☐ Prim's algorithm will compute a valid MCST but Kruskal's algorithm will not.
- ☒ Both Kruskal's algorithm and Prim's algorithm can be used to compute an MCST.

5) How can we use the Floyd-Warshall algorithm for all-pairs shortest paths to detect whether a graph has a negative cycle? **2 points**

- ☐ Check if any shortest path entry $A[i][j]$ is negative.
- ☒ Check if any shortest path entry $A[i][i]$ on the diagonal is negative.
- ☐ Check if any shortest path entry $A[i][j]$ reduces from one iteration to the next.
- ☐ The Floyd-Warshall algorithm cannot be used to detect negative cycles.

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers