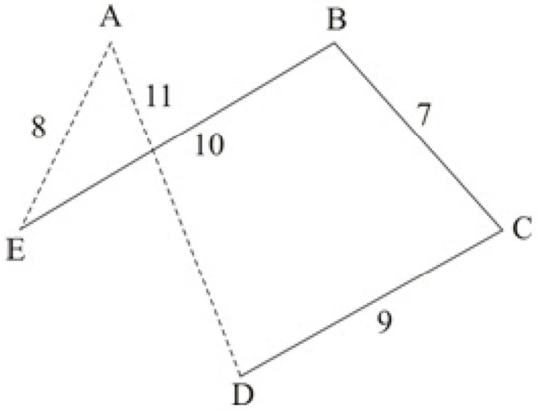
The travelling salesman problem 5C

1 a



Weight of residual minimum spanning tree = 26

Two shortest arcs from A,

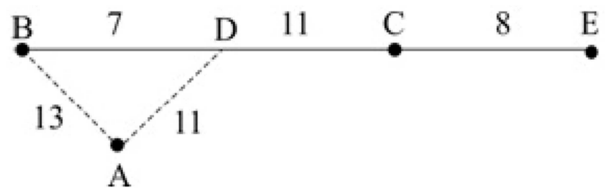
AE and AD

Lower bound = 26 + 8 + 11

= 45

b The lower bound corresponds to a Hamiltonian cycle, so it is an optimal solution.

2 a *Deleting A*



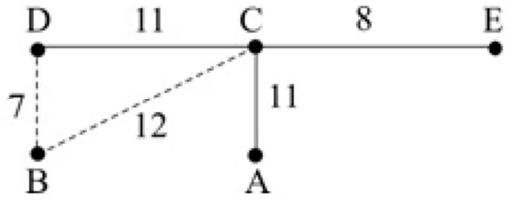
Weight of residual minimum spanning tree = 26

Two shortest arcs are AD and AB

Lower bound = 26 + 11 + 13

= 50

Deleting B



Weight of residual minimum spanning tree = 30

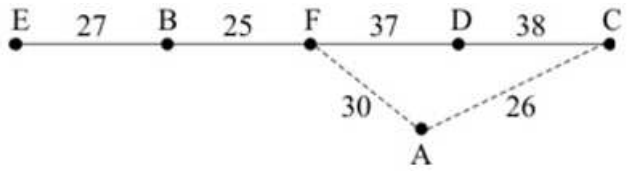
Two shortest arcs are BD and BC

Lower bound = 30 + 7 + 12

= 49

b The better lower bound is 50 since it is higher.

3 a *Deleting A*

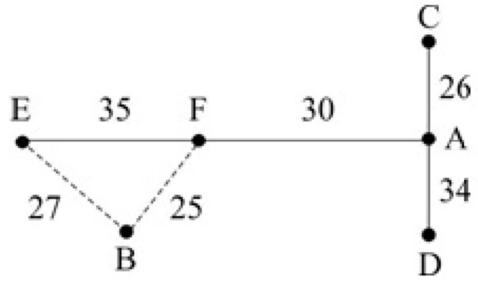


Weight of residual minimum spanning tree = 124

Two shortest arcs AC and AF

Lower bound = 127 + 26 + 30 = 183

Deleting B



Weight of residual minimum spanning tree = 125

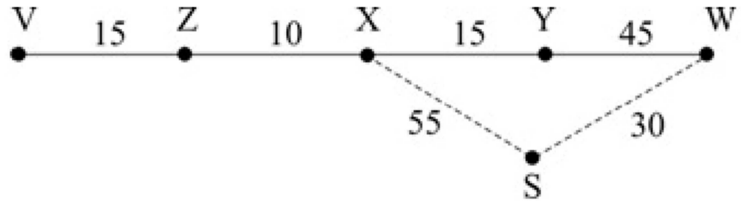
Two shortest arcs BF and BE

Lower bound = 125 + 25 + 27 = 177

b The better lower bound is 183 because it is higher.

c Combining the answer to part **b** and Exercise 5B Question 4, we get $183 <$ optimal value ≤ 190
The first inequality is sharp as the lower bound does not correspond to a Hamiltonian cycle.

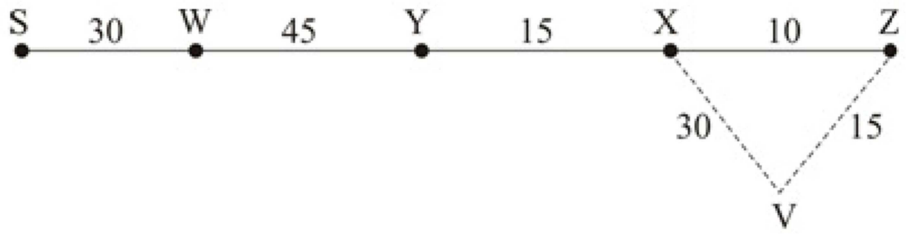
4 a *Deleting S*



Weight of residual minimum spanning tree = 85

Two least arcs SW and SX
Lower bound = 85 + 30 + 55
= 170

Deleting V



Weight of residual minimum spanning tree = 100

Two shortest arcs VZ and VX
Lower bound = 100 + 15 + 30
= 145

b The better lower bound is 170 because it is higher.

c Combining the upper bound with the better lower bound, we get $170 <$ optimal value ≤ 190
The first inequality is sharp as the lower bound does not correspond to a Hamiltonian cycle.