4.7 Given a spanning tree $T=(V,E')$, $E' \subseteq E$, with root node as s, compute the distance to all vertices using the tree edges. For the remaining edges $E-E'$ relax & see if the shortest paths from s can be improved.

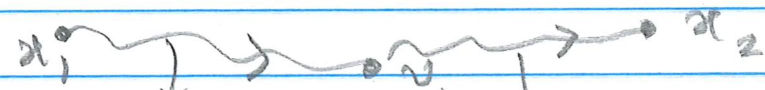
4.9 You need to worry for a negative cycle involving s.

4.10 Easy

4.13 (a) Given G, eliminate all edges of length L determined by the fuel tank capacity. Check if there is a connected component containing s & t. Linear time $\rightarrow O(|V|+|E|)$

(b) Use binary search approach using the above approach.

4.14 Shortest path x_1 to x_2 through v_0



This part is the shortest path from v_0 to x_1 in reverse G.

This part is the shortest path from v_0 to x in G.

4.17 Discussed in the class

4.20 Graph is undirected.
(1) Compute shortest path tree from s to G & from t to G.
(2) For each edge e, determine the shortest path from s to t via e.

5.5 This question was asked in Quiz 3

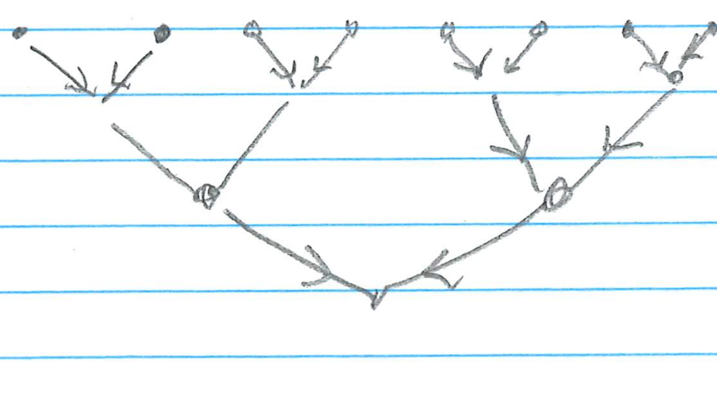
5.6 " " " " " "

5.7 We can change the weight l_e of each edge to $-l_e$. The minimum spanning of the resulting graph G' is the maximum spanning tree of G

5.8 A quiz 3 question

5.11 Easy: you should make sure that you understand

5.12



Flip the picture.

5.13 Huffman encoding. We have not discussed it in the class. You should read yourself.

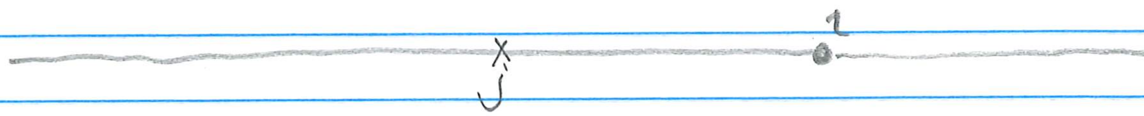
5.23 a) no change (b) change, can be updated in linear time $O(n)$

c) no change (d) change ; remove e & find the smallest cost edge across the resulting cut.

Hints to text book problems

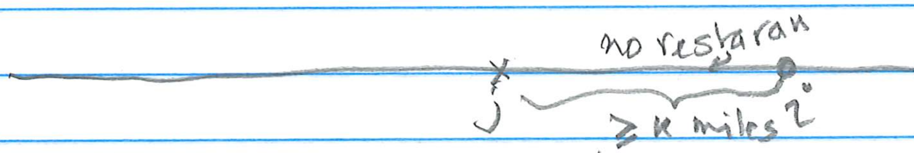
6.2. $D(i)$: minimum total penalty to get to hotel i.

We want $D(n)$.



We stop at i. The previous stop at j costs $D(j) + (200 - \text{distance}(j,i))^2$ at hotel i.

6.3. $D(i)$; max profit can be obtained from locations 1 through i



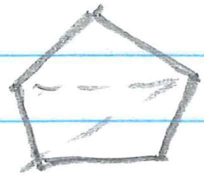
if a restaurant is opened at i, there cannot be any opened restaurant within k miles of i. For any j location, $\text{dist}(j,i) \geq k$, the profit of opening a restaurant at i & j & no restaurant in-between locations i & j is $D(j) + p_i$.

6.8. Discussed in the class

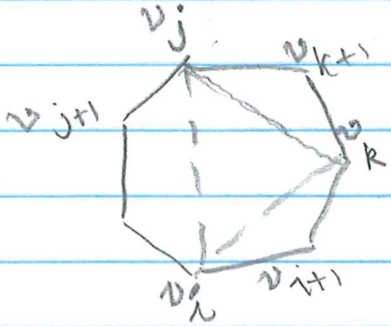
6.10. $L(i,j)$: probability of obtaining exactly j heads in i tossings, $i \geq j$.

On the i th toss, the probability of a head is p_i & the prob of not a head is $(1-p_i)$

6.12



a triangulation.



$A(i,j)$: Cost of optimal triangulation of convex polygon with vertices $v_i, v_{i+1}, \ldots, v_j$

See the figure : $A(i,j) \geq A(i,k) + A(k,j) + \overline{v_i v_j}$ for $i < k < j$.

6.17 It is very similar to the coin change problem of homework # 6.

6.18. It is very similar to the homework problem

6.22 The problem is very similar to the Knapsack problem.