Homework 6

1. Prim's Algo

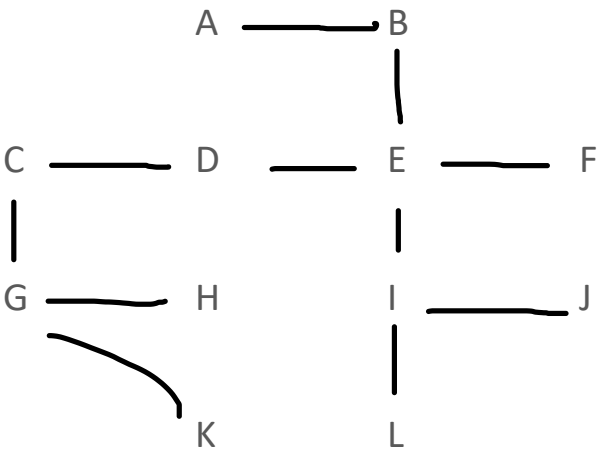
Tree Vertices	Not tree
A	B (A, 2), C (A, 5), D (A, 4), E ((-, -), F ((-, -), G ((-, -), H((-, -), I (-, -), J (-, -), K (-, -), L(-, -)
A, B(A)	C (A, 5), D (A, 4), E ((B, 3), F ((B, 6), G ((-, -), H((-, -), I (-, -), J (-, -), K (-, -), L(-, -)
A, B(A), E(B)	C (A, 5), D (E, 1), F ((E, 2), G ((-, -), H((-, -), I (E, 4), J (-, -), K (-, -), L(-, -)
A, B(A), E(B), D(E)	C (D, 2), F ((E, 2), G ((-, -), H((D, 5), I (E, 4), J (-, -), K (-, -), L(-, -)
A, B(A), E(B), D(E), C(D)	F (E, 2), G ((C, 4), H((D, 5), I (E, 4), J (-, -), K (-, -), L(-, -)
A, B(A), E(B), D(E), C(D), F(E)	G (C, 4), H((D, 5), I (E, 4), J (F, 5), K (-, -), L(-, -)
A, B(A), E(B), D(E), C(D), F(E), G(C)	H(G, 3), I (E, 4), J (F, 5), K (G, 6), L(-, -)
A, B(A), E(B), D(E), C(D), F(E), G(C), H(G)	I (E, 4), J (F, 5), K (G, 6), L(-, -)
A, B(A), E(B), D(E), C(D), F(E), G(C), H(G), I(E)	J (I, 3), K (G, 6), L(I, 5)
A, B(A), E(B), D(E), C(D), F(E), G(C), H(G), I(E), J(I)	K (G, 6), L(I, 5)
A, B(A), E(B), D(E), C(D), F(E), G(C), H(G), I(E), J(I), L(I)	K(G, 6)
A, B(A), E(B), D(E), C(D), F(E), G(C), H(G), I(E), J(I), L(I), K(G)	

2. Kruskal's Algo

Edges: AB = 3, AC = 5, AD = 4, BE = 3, BF = 6, CD = 2, CG = 4, DH = 5, DE = 1, EI = 4, EF = 2, FJ = 5, GH = 3, GK = 6, HK = 7, HI = 6, IL = 5, IJ = 3, JL = 9, KL = 8

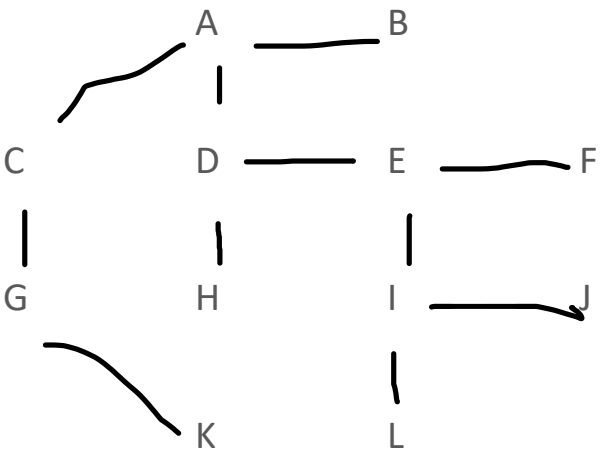
In Order: DE, CD, EF, AB, BE, GH, IJ, AD, CG, EI, DH, FJ, IL, BF, GK, HI, HK, KL, JL

Min Span Tree



3. Dijkstra's Algo

Tree Vertices	Shortest to A
A	B(3), C(5), D(4)
A, B	C(5), D(4), F(9), E(6)
A, B, D	C(5), E(5), F(9), H(9)
A, B, D, C	E(5), F(9), H(9), G(9)
A, B, D, C, E	F(7), H(9), G(9), I(9)
A, B, D, C, E, F	H(9), G(9), I(9), J(12)
A, B, D, C, E, F, G	H(9), I(9), J(12), K(15)
A, B, D, C, E, F, G, H	I(9), J(12), K(15)
A, B, D, C, E, F, G, H, I	J(12), K(15), L(14)
A, B, D, C, E, F, G, H, I, J	K(15), L(14)
A, B, D, C, E, F, G, H, I, J, L	K(15),
A, B, D, C, E, F, G, H, I, J, L, K	



4. Huffman Code

a. Construct

B(.1) D(.15) _ (.15) C(.2) A(.4)

_ (.15) C(.2) (.25 (B and D)) A(.4)

(.25 (B and D)) (.35 (_ and C)) A(.4)

A(.4) (.6 (.25 (B and D) and .35 (_ and C))

1.0

A (.4) .6

.25 .35

B (.1) D (.15) _ (.15) C (.2)

A = 0, B = 100, C = 111, D = 101, _ = 110

b. Encode ABACABAD

0100011101000101

c. Decode 100 0 101 110 0 101 0

B A D _ A D A

5. P, NP, and NP Complete Problems

   a. P, NP, and NPC are not all equal and so cannot be classified as one thing.

   b. P is a subset of NP and so isn't equal, NPC is a subset of NP though so getting closer.

   c. P and NPC do not make up the entirety of NP and so drawing the line down the middle is ignoring the extra problems.

   d. NPC is a problem that can be broken down to a P problem but that doesn't necessarily mean that there is overlap.

   e. This one seems good.

6. Decision Trees

   a. What is Infor-Theoretic lower bound?

It would take at most 3 decisions

   b. Draw tree