Problem Set 2

Problem 1

A.

There neighbors with costs are:

{C,D,F}->Error(S)=22

{C,E,F}->Error(S)=16

{C,F,G}->Error(S)=11

{C,F,H}->Error(S)=9

{C}->Error(S)=1

{F}->Error(S)=10

So state {C} is the best neighbor.

In the next step, we will try to add another object to {C}, or delete C. Thus, we will stop the algorithm because state {C} is the local minimum.

B.

State Space: 2^N. Because for each object there are two status: choose or don't choose

Maximal number of neighbors: N. Because for a not choosed object, we can choose next round. For a choosed object, we can remove next round. So there are N possible neighbor.

Problem 2

1. $\neg A \vee \neg B \vee \neg C$
2. $(\neg C \vee \neg D) \wedge (\neg C \vee \neg E) \wedge (D \vee E \vee C)$
3. $\neg D \vee B$
4. $(\neg D \vee \neg E \vee \neg B) \wedge (\neg D \vee \neg E \vee A)$
5. $(\neg D \vee E) \wedge (\neg E \vee D)$

Problem 3

S0:

- $\neg A \vee \neg B \vee \neg C$
- $\neg C \vee \neg D$

- $\neg C \vee \neg E$
- $D \vee E \vee C$
- $\neg D \vee B$
- $\neg D \vee \neg E \vee \neg B$
- $\neg D \vee \neg E \vee A$
- $\neg D \vee E$
- $\neg E \vee D$

S1:{A=true}

- $\neg B \vee \neg C$
- $\neg C \vee \neg D$
- $\neg C \vee \neg E$
- $D \vee E \vee C$
- $\neg D \vee B$
- $\neg D \vee \neg E \vee \neg B$
- Satisfied
- $\neg D \vee E$
- $\neg E \vee D$

S2:{A=true,B=true}

- $\neg C$
- $\neg C \vee \neg D$
- $\neg C \vee \neg E$
- $D \vee E \vee C$
- Satisfied
- $\neg D \vee \neg E$
- Satisfied
- $\neg D \vee E$
- $\neg E \vee D$

S3:{A=true,B=true,C=true}

- null
- $\neg D$
- $\neg E$

- Satisfied
- Satisfied
- $\neg D \vee \neg E$
- Satisfied
- $\neg D \vee E$
- $\neg E \vee D$

Failed, Roll back to S2 and set C=false

S3:{A=true,B=true,C=false}

- Satisfied
- Satisfied
- Satisfied
- $D \vee E$
- Satisfied
- $\neg D \vee \neg E$
- Satisfied
- $\neg D \vee E$
- $\neg E \vee D$

S4:{A=true,B=true,C=false,D=true}

- Satisfied
- Satisfied
- Satisfied
- Satisfied
- Satisfied
- $\neg E$
- Satisfied
-
- Satisfied

Failed. Roll Back to S3 and select D=false.

Failed. Roll Back to S2 and select B=false.

S2:{A=true,B=false}

- Satisfied
- $\neg C \vee \neg D$

- $\neg C \vee \neg E$
- $D \vee E \vee C$
- $\neg D \vee B$
- Satisfied
- Satisfied
- $\neg D \vee E$
- $\neg E \vee D$

S3:{A=true,B=false,C=true}

- Satisfied
- $\neg D$
- $\neg E$
- Satisfied
- $\neg D$
- Satisfied
- Satisfied
- $\neg D \vee E$
- $\neg E \vee D$

S4:{A=true,B=false,C=true,D=false}

- Satisfied
- Satisfied
- $\neg E$
- Satisfied
- Satisfied
- Satisfied
- Satisfied
- Satisfied
- $\neg E$

S4:{A=true,B=false,C=true,D=false,E=false}

- Satisfied
- Satisfied
- Satisfied
- Satisfied

- Satisfied
- Satisfied
- Satisfied
- Satisfied
- Satisfied

So, A and C is true. BDE is false.