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HW # 4

Problem 1:

1. A => ¬(B ^ C)  
2. C <=> ¬(D V E)   
3. D => B   
4. D => B   
5. (D^E) => ¬B ^ A   
6. D <=> E

1. ¬A + ¬(B \* C)

¬A + ¬B + ¬C

2. (C => ¬(D\*E))  \* (¬(D\*E)  => C)

(¬C + ¬D + ¬E ) \* (D\*E + C)

(¬C + ¬D + ¬E ) \* ( C+D) \* (C+E)

3. ¬D + B

4. ¬D + B

5. ¬ (D\*E) + (¬B \* A)

¬D + ¬E + ¬B \* A

¬D + (¬E+ ¬B) \* (¬E + A)

(¬D+ ¬E + ¬B) \* (¬D + ¬E + A)

6. (D => E) \* (E => D)

(¬D + E) \* (¬E + D)

Final answer:

¬A V ¬B V ¬C

¬C V ¬D V ¬E

C V D

C V E

¬D V B

¬D V ¬E V ¬B

¬D V ¬E V A

¬D V E

¬E V D

Problem 2:

No pure literal

A = True;

¬B V ¬C

¬C V ¬D V ¬E

C V D

C V E

¬D V B

¬D V ¬E V ¬B

¬D V E

¬E V D

No pure literal

A= True; B = True;

¬C

¬C V ¬D V ¬E

C V D

C V E

¬D V ¬E

¬D V E

¬E V D

¬C is singleton

A= True; B = True; C = False;

D

E

¬D V ¬E

¬D V E

¬E V D

D and E both singleton

A= True; B = True; D = True, E = True

¬D V ¬E is empty

Try A= True; B= False;

¬C V ¬D V ¬E

C V D

C V E

¬D

¬D V E

¬E V D

No pure literal

A= True; B= False; C = True;

¬D V ¬E

¬D

¬D V E

¬E V D

¬D is singleton

A= True; B= False; C=True; D = False;

¬E

¬E is singleton

A= True; B= False; C=True; D = False; E =False;

Empty Set

Final answer is A= True; B= False; C=True; D = False; E = False;

Problem 3:

1. Each index must have one of the vertex

A1 V B1 V C1 V D1 V E1 V F1 V G1 V H1 V I1 V J1

A2 V B2 V C2 V D2 V E2 V F2 V G2 V H2 V I2 V J2

A3 V B3 V C3 V D3 V E3 V F3 V G3 V H3 V I3 V J3

…

A9 V B9 V C9 V D9 V E9 V F9 V G9 V H9 V I9 V J9

A10 V B10 V C10 V D10 V E10 V F10 V G10 V H10 V I10 V J10

2. Each vertex should have one or the other index

A1 V A2

A1 V A3

A1 V A4

A1 V A5

…

A1 V A9

A1 V A10

A2 V A3

A2 V A4

…

A10 V A9

B1 V B2

B1 V B3

…

J10 V J9

3. If a vertex has that index, other vertices should not have it

A1 ^ ¬B1 ^ ¬C1 … ^ ¬I1 ^ ¬J1

A2 ^ ¬B2 ^ ¬C2 … ^ ¬I2 ^ ¬J2

A3 ^ ¬B3 ^ ¬C3 … ^ ¬I3 ^ ¬J3

…

A10 ^ ¬B10 ^ ¬C10 … ^ ¬I10 ^ ¬J10

B1 ^ ¬C1 … ^ ¬I1 ^ ¬J1 ^ ¬A1

…

B10 ^ ¬C10 … ^ ¬I10 ^ ¬J10 ^ ¬A10

C1 ^ ¬D1 … ^ ¬I1 ^ ¬J1 ^ ¬A1 ^ ¬B1

…

J1 ^ ¬A1 ^ ¬B1 … ^ ¬H1 ^ ¬I1

…

J10 ^ ¬A10 ^ ¬B10 … ^ ¬H10 ^ ¬I10

4. For vertices that are not connected, cannot have both vertices for each index

¬A1 V ¬C1

¬A1 V ¬D1

¬A1 V ¬E1

¬A1 V ¬H1

¬A1 V ¬I1

¬A1 V ¬J1

¬A2 V ¬C2

¬A2 V ¬D2

…

¬A10 V ¬I10

¬A10 V ¬J10

¬B1 V ¬E1

¬B1 V ¬F1

¬B1 V ¬I1

¬B1 V ¬J1

¬B2 V ¬E2

¬B2 V ¬F2

…

¬B10 V ¬I10

¬B10 V ¬J10

¬C1 V ¬E1

¬C1 V ¬F1

¬C1 V ¬G1

¬C1 V ¬H1

¬C1 V ¬I1

¬C1 V ¬J1

¬C2 V ¬E2

¬C2 V ¬F2

…

¬C10 V ¬I10

¬C10 V ¬J10

¬D1 V ¬F1

¬D1 V ¬J1

¬D2 V ¬F2

…

¬D10 V ¬F10

¬D10 V ¬J10

¬E1 V ¬F1

¬E1 V ¬G1

¬E1 V ¬H1

¬E2 V ¬F2

…

¬E10 V ¬G10

¬E10 V ¬H10

¬F1 V ¬I1

¬F1 V ¬J1

¬F2 V ¬I2

…

¬F10 V ¬I10

¬F10 V ¬J10

¬G1 V ¬I1

¬G1 V ¬J1

¬G2 V ¬I2

…

¬G10 V ¬J10

¬H1 V ¬J1

¬H2 V ¬J2

…

¬H10 V ¬J10