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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