SE 4367 Homework #7, CEGDT

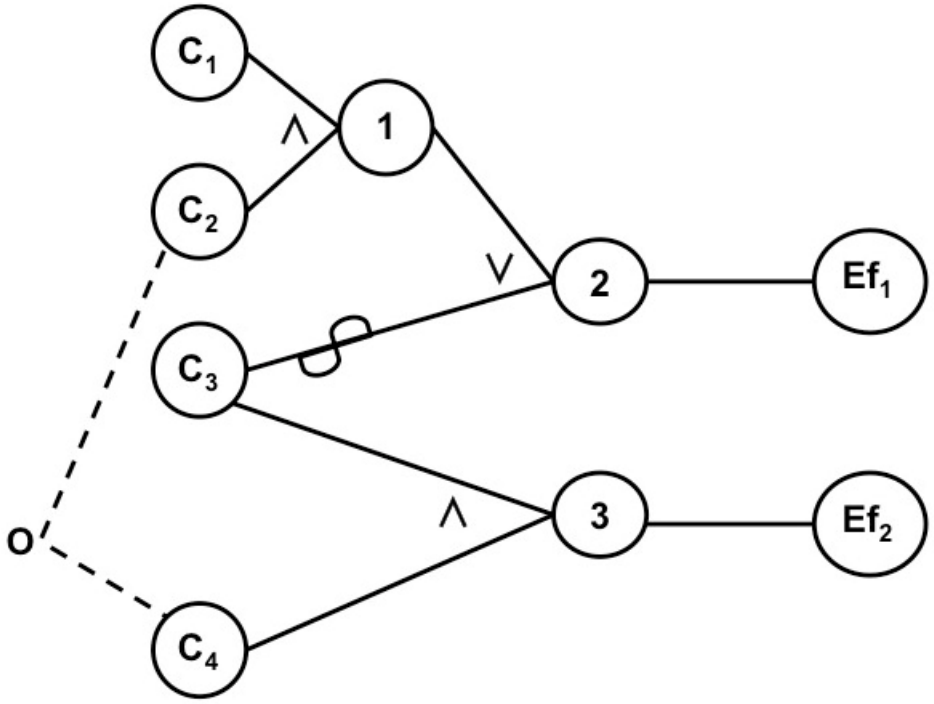
Given the cause-effect graph below

a) Generate the Boolean expression for this CEG

- **excluding the one-and-only-one operation (the "O")**

b) Generate the decision table for the CEG.

- **You do not have to include the AND/OR heuristics to avoid combinatorial explosion.**



Grading Rubric

Boolean expression, 35 points

- **Each Boolean variable and operator correct is worth 5 points**

Decision table, 65 points

- **Each vector Vi correct is worth 10 points**
- **Getting the one-and-only-one operation correct is worth 5 points**

Formatting Submissions

In the file name, include:

- **class**
- **assignment identifier**
- **your name (or team's name)**
  - **e.g., se4367a01jdoe**

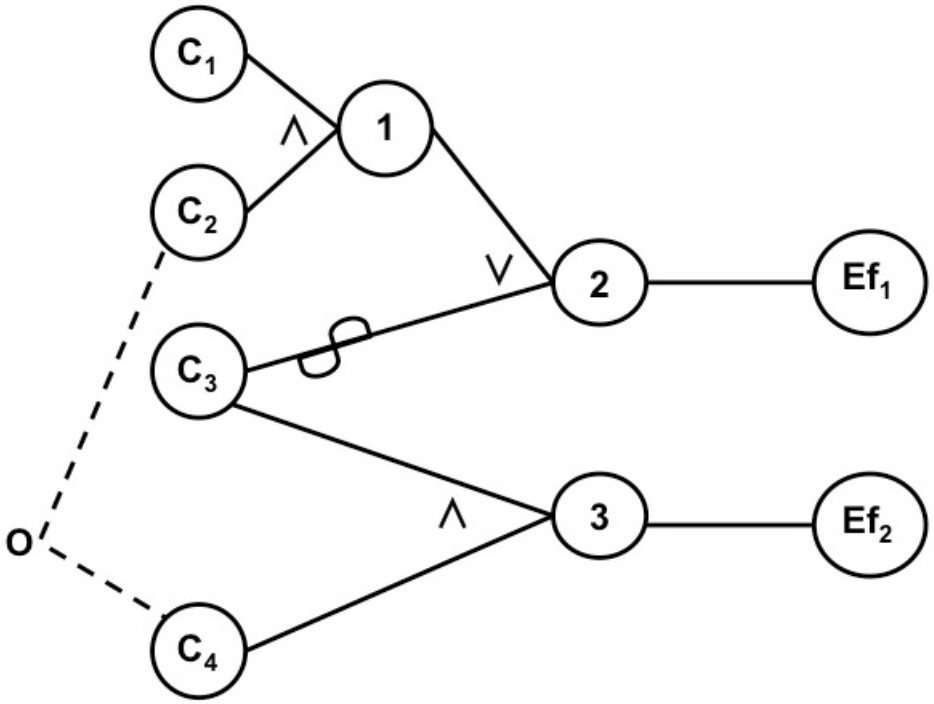
In the file (or hardcopy) submitted, include the class, assignment, and name information at the top.

Minus 5 points per violation. Potentially 30 points off for formatting mistakes!

7a) Boolean Expression

$Ef_1 = C_1C_2 \vee \ !C_3$

$Ef_2 = C_3C_4$



Note the one-and-only-one relationship between C_2 and C_4 is not addressed in the Boolean expression

7b) CEG Decision Table

Step 1. Initialize DT to empty, DT is N=p+q by M
p = 4, q = 2

Step 2.1 For i=1,q for effects, select the next effect to process, e = $Ef_1 = C_1C_2 \vee !C_3$

Step 2.2 Find combinations of conditions that cause e = $Ef_1 = C_1C_2 \vee !C_3$

C_1	C_2	C_3	Ef_1
0	0	0	1
~~0~~	~~0~~	~~1~~	~~0~~
0	1	0	1
~~0~~	~~1~~	~~1~~	~~0~~
1	0	0	1
~~1~~	~~0~~	~~1~~	~~0~~
1	1	0	1
1	1	1	1

Note that this table is laid out from 0 to 7 as a matter of convenience.

Let V_1, V_2, … be the combinations of causes that lead to e

- Set $V_k(l)$, $p < l \leq p+q$ to 0 or 1 depending on whether EF_{l-p} is present for all conditions in V_k
- Address the one-and-only-one constraint "O" for C_2 and C_4 in the CEG

	C_1	C_2	C_3	C_4	Ef_1	Ef_2
V_1=	0	0	0	1	1	0
V_2=	0	1	0	0	1	0
V_3=	1	0	0	1	1	0
V_4=	1	1	0	0	1	0
V_5=	1	1	1	0	1	0

Step 2.3 Update the decision table.

	V_1	V_2	V_3	V_4	V_5
C_1	0	0	1	1	1
C_2	0	1	0	1	1
C_3	0	0	0	0	1
C_4	1	0	1	0	0
Ef_1	1	1	1	1	1
Ef_2	0	0	0	0	0

For i=1,q for effects, select the next effect to process, e = $Ef_2 = C_3C_4$

Step 2.2 Find combinations of conditions that cause e = $Ef_2 = C_3C_4$

C_3	C_4	Ef_2
1	1	1

Let V_1, V_2, … be the combinations of causes that lead to e

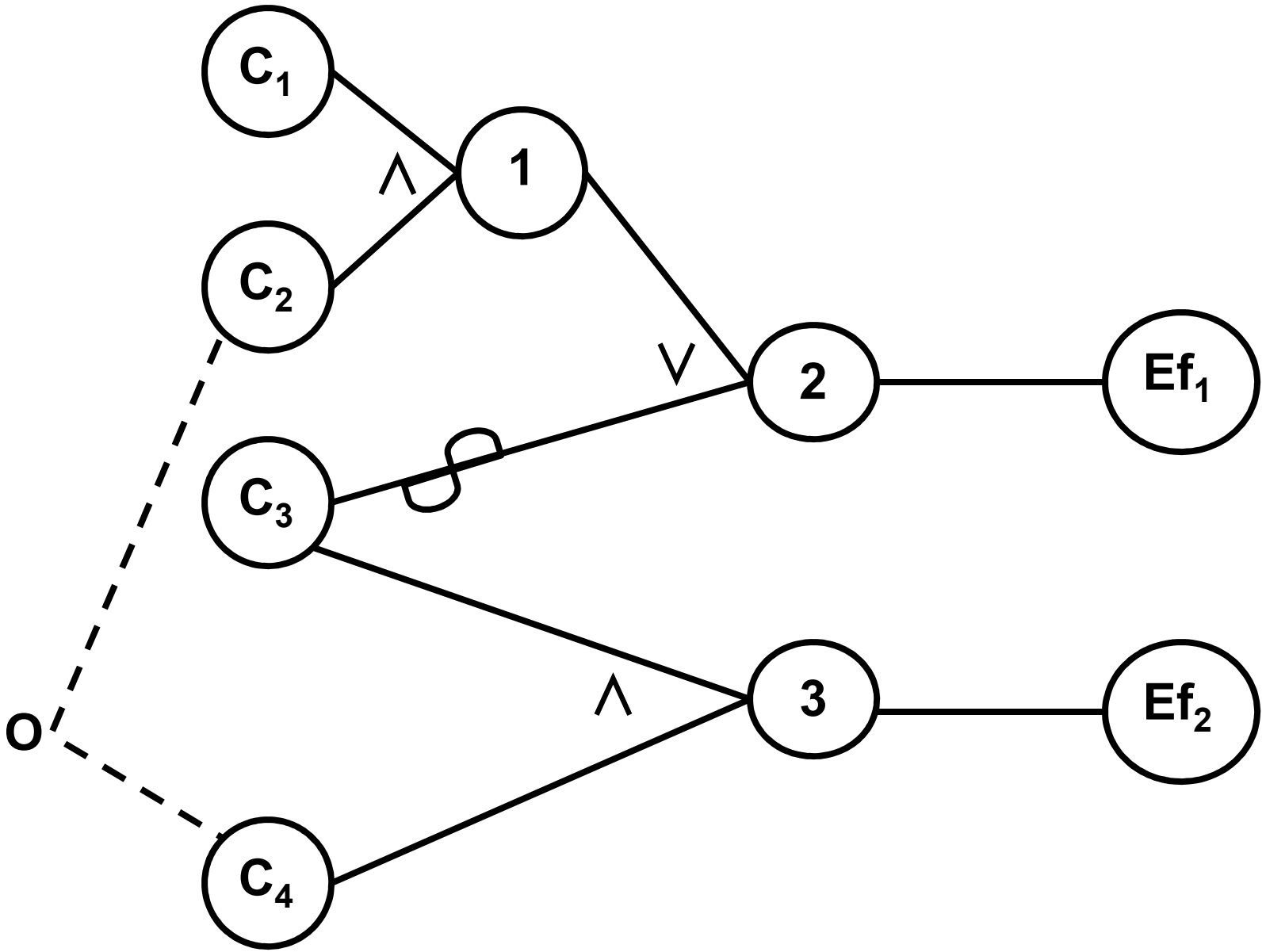
- Set $V_k(l)$, $p < l \leq p+q$ to 0 or 1 depending on whether EF_{l-p} is present for all conditions in V_k

- Address the one-and-only-one constraint "O" for C_2 and C_4 in the CEG

	C_1	C_2	C_3	C_4	Ef_1	Ef_2
V_6=	0	0	1	1	0	1
~~V_x=~~	~~0~~	~~1~~	~~1~~	~~1~~	~~0~~	~~1~~
V_7=	1	0	1	1	0	1
~~V_y=~~	~~1~~	~~1~~	~~1~~	~~1~~	~~0~~	~~1~~

Step 2.3 Update the decision table.

	V_1	V_2	V_3	V_4	V_5	V_6	V_7
C_1	0	0	1	1	1	0	1
C_2	0	1	0	1	1	0	0
C_3	0	0	0	0	1	1	1
C_4	1	0	1	0	0	1	1
Ef_1	1	1	1	1	1	0	0
Ef_2	0	0	0	0	0	1	1


C1
C2
C3
C4
O
1
2
3
∧
∨
∧
Ef1
Ef2