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HW # 6

Problem 1:

Rules:

1. `Child(x,y,z) → Parent(y,x)`
2. `Child(x,y,z) → Parent(z,x)`
3. `Parent(x,y) ^ Parent(x,z) → Sibling(y,z).`

Facts:

4. `Child(Mary,Henry,Catherine).`
5. `Child(Edward,Jane,Henry).`

I) Parent (Henry, Mary) using rule 1 with substitution of fact 4

II) Parent (Catherine, Mary) using rule 2 with substitution of fact 4

III) Parent (Jane, Edward) using rule 1 with substitution of fact 5

IV) Parent(Henry, Edward) using rule 2 with substitution of fact 5

V) Sibling(Edward, Mary) using rule 3 with substitution of statement I and statement IV

Problem 2:

a)

P(X=a) = 0.35
P(X=b) = 0.25
P(X=c) = 0.4
P(Y=d) = 0.4
P(Y=e) = 0.45
P(Y=f) = 0.15

b) x and y are independent if P(x=x and y=y) = p(x=x) * p(y=y)

P(x=a and y= d) =? P(x=a) * P(y=d)

0.1 =? 0.35 * 0.4

0.1 =/= 0.14

Since the condition is not met, x and y is not independent.

c) P(X=a | Y=e) = P(x= a and y=e) / p(y=e) = 0.2 / 0.45 = 4/9

Problem 3:

A) 0.2*2/5+ 0.6*2/5 + 0.9*1/5 = 0.5

B) P(category 1 | 1 head) = 2/5*0.2/0.5= 0.16

P(category 2| 1 head) = 2/5*0.6 / 0.5= 0.48

P(category 3| 1 head) = 1/5* 0.9 / 0.5= 0.36

C) P(category 1 | 2 heads) = 2/5 *0.2*0.2 / 0.322 = 0.0497

P(category 2| 2 heads) = 2/5* 0.6* 0.6/ 0.322 = 0.447

P(category 3| 2 heads) = 1/5 * 0.9 * 0.9 /0.322 = 0.503