

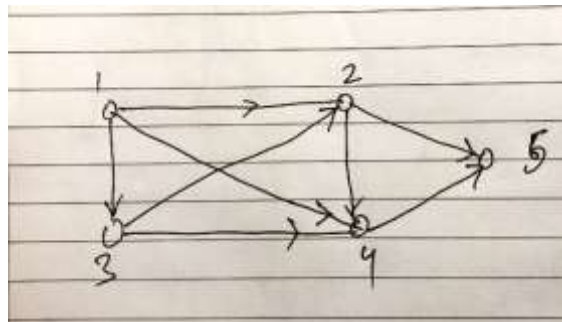
### Question 3

Yes, this changes the answers to our three queries from section 4.1. Yes, if there any possibility that we have to compare two persons say, Bruce & John to be father of any child given like bob, bill or sam then there can be a possibility to differentiate the two using the defined lines in 21,22.

### Question 5

No, because this concludes that if X is not child then X is person, as there are only two sort representing living object i.e. person and child.

### Question 7 & 8



This graph is used for the question 7 and 8.

For question 7, I tried to show the condition of  $\text{connected}(X,Y)$  as two vertex shares an edge then it is known as connected. Additionally, also following the basic definition from graph theory that every node is connected to itself. My solution set includes:

$\text{connected}(4,5)$   $\text{connected}(1,2)$   $\text{connected}(1,3)$   $\text{connected}(1,4)$   $\text{connected}(2,4)$   $\text{connected}(2,5)$   
 $\text{connected}(3,2)$   $\text{connected}(3,4)$   $\text{connected}(1,1)$   $\text{connected}(2,2)$   $\text{connected}(3,3)$   $\text{connected}(4,4)$   
 $\text{connected}(5,5)$

For question 8, I added additional condition that the vertex are connected are not blocked and the vertex which are blocked are not connected. This solution also leads the definition of blocked, as there is another vertex in between the edge that tells us that there are more than one edge. My solution set for blocked includes :  $\text{blocked}(1,5)$   $\text{blocked}(3,5)$ . This can be easily seen in the picture.

### Question 9

As hint provided in the question, I created the hierarchy of flying objects into two subclasses which are also siblings, these are jet and birds. And jet is having an object named SR\_71 blackbird. While bird are having another subclasses as eagle and robin, additionally robin is having object named Jo. As in the question provided the knowledge that jet is faster than birds, eagle is faster than robin. And the solution should reflect that SR\_71 blackbird is faster than Jo. For this I created a condition,  $\text{fly\_faster}(X,Y)$  where I claimed that  $X > Y$  w.r.t speed, further for reflecting the complete output, I provided the knowledge base relation between jet & bird and eagle & robin. My solution set includes:

$\text{flyfaster}(\text{jet}, \text{bird})$   $\text{flyfaster}(\text{eagle}, \text{robin})$   $\text{flyfaster}(\text{sr71black}, \text{jo})$

### Question 12a

I took the code from section 4.3 and added the snippet given in the question. Then I defined the -leaf as hinted in the question as `-leaf(C) :- class(X), subclass(X,C)`, which means that if there is subclass X belongs to class C then it is not a leaf, as given in statement of part a. By predicate logic the leaf can be defined as not true of -leaf, `leaf(C) :- class(C),not -leaf(C)`. My solution set includes:

```
leaf(sub) leaf(car) -leaf(vehicle) -leaf(machine)
```