Exercise 1: consider the following animal knowledge base:

R1 IF the animal has hair THEN it is a mammal
R2 IF the animal gives milk THEN it is a mammal
R3 IF the animal has feathers THEN it is a bird
R4 IF the animal flies the animal lays eggs THEN it is a bird
R5 IF the animal is a mammal the animal eats meat THEN it is a carnivore
R6 IF the animal is a mammal the animal has pointed teeth the animal has claws the animal's eyes point forward THEN it is a carnivore
R7 IF the animal is a mammal the animal has hooves THEN it is an ungulate
R8 IF the animal is a mammal the animal chews cud THEN it is an ungulate AND it is even-toed
R9 IF the animal is a carnivore the animal has a tawny color the animal has dark spots THEN it is a cheetah
R10 IF the animal is a carnivore the animal has a tawny color the animal has black stripes THEN it is a tiger
R11 IF the animal is an ungulate  
the animal has long legs  
the animal has a long neck  
THEN it is a giraffe

R12 IF the animal is an ungulate  
the animal has a white color  
the animal has black stripes  
THEN it is a zebra

R13 IF the animal is a bird  
the animal does not fly  
the animal has long legs  
the animal has a long neck  
the animal is black and white  
THEN it is an ostrich

R14 IF the animal is a bird  
the animal does not fly  
the animal swims  
the animal is black and white  
THEN it is a penguin

R15 IF the animal is a bird  
the animal is a good flier  
THEN it is an albatross

Questions:

Q1. Given these facts in working memory initially:

the animal gives milk  
the animal chews its cud  
the animal has long legs  
the animal has a long neck

Give the different facts deduced by the inference engine when using forward chaining (data driven reasoning). For conflict resolution, use rule order as implied priority (if there is a conflict, choose the rule with smallest number). Stop when reaching an animal.

Q2. Given the facts in working memory initially:

the animal has hair  
the animal has claws  
the animal has pointed teeth  
the animal's eyes point forward  
the animal has a tawny color  
the animal has dark spots

Is the animal a cheetah? Justify using backward chaining (Goal driven reasoning)
Exercise 2. Consider the following Knowledge Base:

Rule 1: If A and B Then C
Rule 2: If A and not(B) Then D
Rule 3: If C and D Then E
Rule 4: If B and E and F then G
Rule 5: If A and E Then H
Rule 6: If D and E and H Then I
Rule 7: If not(C) Then E
Rule 8: If A and E and I Then G
Rule 9: If H and G Then K

Questions:

Q1. Given these facts in working memory initially: A and F
List the different facts deduced by the inference engine when using forward chaining (data driven reasoning). For conflict resolution, use rule order as implied priority (if there is a conflict, choose the rule with smallest number). For the case of fact with negation, use closed world assumption: if the fact is present in WM (working Memory) then it is true (its negation is false) otherwise it is false (its negation is true).

Q2. Given the facts in working memory initially: A
Is the goal I true or false? Justify using backward chaining (Goal driven reasoning). For conflict resolution, use rule order as implied priority (if there is a conflict, choose the rule with smallest number).