Revision

1)Using truth tables, prove that

$\neg(\alpha \rightarrow \neg\beta) = (\alpha \& \beta)$

$(\neg\alpha \rightarrow \beta) = (\alpha \vee \beta)$.

$\neg((\alpha \rightarrow \beta) \rightarrow \neg(\beta \rightarrow \alpha)) = (\alpha \leftrightarrow \beta)$.

$((\alpha|\beta)|(\alpha|\beta)) = (\alpha \& \beta)$

$((\alpha|\alpha) \mid (\beta|\beta)) = (\alpha \vee \beta)$

$(\alpha \mid (\beta \mid \beta))$ is equivalent to $(\alpha \rightarrow \beta)$

http://www.el-dosuky.com/teach/logic_14/lecs/03/2-4-PL.pdf

2)Assume that KB = $(B \leftrightarrow p \vee q) \& \sim B$ $\alpha = \sim p$.

Convert KB into **Conjunctive Normal Form (CNF)**.
Use **Resolution** to show that KB $\models \alpha$
http://www.el-dosuky.com/teach/logic_14/lecs/08/KB.pdf

3) For each of the following compound statements, first identify the primitive statements p, q, r, etc. of which it is composed. Then express the statement.

a. If n is an integer, then either n is even or n is odd.

b. If an integer is prime and is greater than 2, then the integer is odd.

c. If n is not negative and its square is less than 4, then either n is zero or n is positive and less than 2.

d. If an integer is even and greater than 2, then it is not prime.

http://www.el-dosuky.com/teach/logic_14/labs/02/lab2.pdf

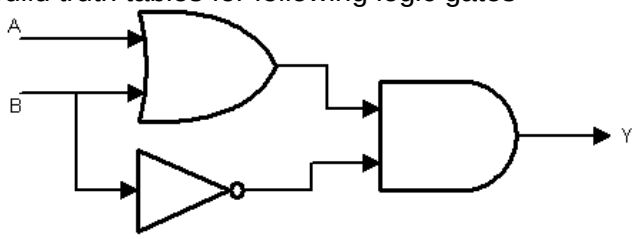
4)Draw logic circuit for

((not A)and(not B)and(not C)) or(A and B)or(B and C)or((A nor A)nor(C nor C))

http://www.el-dosuky.com/teach/logic_14/lecs/04/2-6-Logic-Gates.pdf

5)

Build truth tables for following logic gates



http://www.el-dosuky.com/teach/logic_14/labs/04/logicGates.pdf

6)

Consider we have the following hypotheses by Shokria

1. If it does not rain or it is not foggy then I go to my grandmother and a party will be held.
2. If the party will be held, then there is a cake.
3. There is not a cake.

Prove that "it rained".

To unify answers, you must :

1. Use prepositional logic derivations on symbols {p, q, r, s, t}
2. Use or-introduction, and-elimination, modus tollens, modus ponens in your proof.

http://www.el-dosuky.com/teach/logic_14/labs/05/extra5.pdf

11)

Given the universe of discourse = {1,2,3,4}, express each of the following using logical connectives (¬, $\wedge$, $\vee$) but without using quantifiers.

a. $\forall$ x P(x)

b. $\exists$ x P (x)

c. $\forall$ x ((x < 3) $\rightarrow$ P(x))

d. $\exists$ x ((x is even) $\wedge$ ¬ P(x))

http://www.el-dosuky.com/teach/logic_14/labs/09/quantifiers.pdf

12)Represent the following sentences using FOL

One's mother is one's female parent
One's husband is one's male spouse
Male and female are disjoint categories
Parent and child are inverse relations
A grandparent is a parent of one's parent

http://www.el-dosuky.com/teach/logic_14/lecs/09/4-1-Predicate-logic.pdf

13)

A set is a subset of another if and only if all first's members are members of the second.
Two sets are equal if and only if each is a subset of the other.
An object is a member of the intersection of two sets if and only if it is a member of each of the sets.
An object is a member of the union of two sets if and only if it is a member of either set.

http://www.el-dosuky.com/teach/logic_14/lecs/09/4-1-Predicate-logic.pdf

14) Using the following facts

1. Marcus was a man.
2. Marcus was a Pompeian.
3. All Pompeians were Romans.
4. Caesar was a ruler.
5. All Romans were either loyal to Caesr or hated him.
6. Everyone is loyal to someone.
7. People only try to assassinate rulers they are not loyal to.
8. Marcus tried to assassinate Caesar.

Answer the question "Did Marcus hate Caesar".

http://www.el-dosuky.com/teach/logic_14/labs/10/Inference-FOL.pdf

15) Consider the following sentences

- John likes all kinds of food
- Apples are food
- Chicken is food
- Anything anyone eats and isn't killed by is food
- Bill eats peanuts and is still alive
- Sue eats everything Bill eats

(a) Translate these sentences into formulas in predicate logic
(b) Prove that John likes peanuts using **BACKWARD CHAINING**
(c) Convert the formulas of part (a) into clause form
(d) Prove that John likes peanuts using resolution

http://www.el-dosuky.com/teach/logic_14/labs/10/Inference-FOL.pdf

16) Assume the following facts :

- Steve only likes easy courses.
- Science courses are hard.
- All the courses in the basketweaving department are easy.
- BK301 is a basketweaving course.

Use resolution to answer the question, "What course would Steve like?"

http://www.el-dosuky.com/teach/logic_14/labs/10/Inference-FOL.pdf

17) write a prolog program that takes two numbers X1 and X2 and outputs the minimum of them

http://www.el-dosuky.com/teach/logic_14/Prolog-Imperatively.pdf

18) write a prolog program that takes a numbers N and outputs the minimum of them

http://www.el-dosuky.com/teach/logic_14/Prolog-Imperatively.pdf

19) Prove that: Negating facts can be achieved by asking the user for constants that do not appear elsewhere in the knowledge base

http://www.el-dosuky.com/research/p/abs/4-overcoming-misleads-in-logic-programs-by-redefining-negation.txt.pdf