Assignment Two: To be solved in your note.

1. Consider the propositions :

p: Kukoyi laughs
q:Johnson smiles
r: Jones shouts

Write in words the following compound propositions:

(i) $p \rightarrow (q \veebar r)$
(ii) $(r \wedge q) \leftrightarrow p$
(iii) $(p \rightarrow \bar{q}) \wedge (r \rightarrow q)$
(iv) $p \vee (\bar{q} \vee \bar{r})$
(v) $(p \vee r) \leftrightarrow \bar{q}$.

i) If Kukoyi laugs then Johnson smiles or Jones shouts but not both.

ii) If and only if Jones shouts and Johnson smiles then Kukoyi laughs

iii) If Kukoyi laughs then Johnson does not smile and If Jones shouts then Johnson smiles

iv) Kukoyi laughs or Johnson does not smiles or Jones does not shouts

v) If and only if Kukoyi laughs or Jones shouts then Johnson does not smiles.

2. Let p, q and r denote the following propositions:

p : Bats are blind.
q : Gnats eat grass.
r : Ants have long teeth.

Express the following compound propositions symbolically.

(i) If bats are blind then gnats don't eat grass.

p -> ¬q

(ii) If and only if bats are blind or gnats eat grass then ants don't have longteeth.

(p v q)<-> ¬r

(iii) Ants don’t have long teeth and, if bats are blind, then gnats don’t eat grass.
¬r ⋀ (p -> ¬q)

(iv) Bats are blind or gnats eat grass and, if gnats don’t eat grass, thenants don’t have long teeth.
(p v q) ⋀ (¬q -> ¬r)

3. Consider the two propositions:
p : Taiwo is rich.
q : Taiwo is dishonest.
Under what circumstances is the compound proposition ‘If Taiwo is honest then she is not rich’ false?

Under all circumstance

f -> f is always f

4. Determine whether each of the following is a tautology, a contradictionorneither:

$(p \rightarrow \bar{q}) \vee (\bar{r} \rightarrow p)$

$[p \rightarrow (q \wedge r)] \leftrightarrow [(p \rightarrow q) \wedge (p \rightarrow r)]$

$[(p \vee q) \rightarrow \bar{r}] \veebar (\bar{p} \vee \bar{q})$.