ITCS254/ITCS258

Test1 Revision

1- Show without using the truth table that $[\neg p \wedge (p \vee q)] \rightarrow q$ is a tautology

2- Show using logical identities that $\neg(\neg p \vee \neg(p \wedge q))$ is a tautology

3- Assume the domain for x ={ Anna, Tom, Vicky } and the domain for y ={ Toyota, Honda, Ford}.Assume anna repairs all cars, Tom repairs Honda and Ford and Vicky repairs only Ford. Assume Anna and Tom are mechanic and Vicky and tom are electrician,Also assume Toytoa is the only sport car and Honda is the only compact car. Find the true for each

a- All cars are neither sport nor compact.

b- All mechanics repair some sport cars.

c- No persons repair all not compact cars.

4- Let

p: “I finish my homework”

q: “I play soccer”

r: “The weather is windy”

s: “The weather is cloudy”

Answer the following:

a. Give the statement $p \vee q \rightarrow \neg s \vee \neg r$ in English using unless

b. Give the inverse in symbolic for the statement:
I finish my homework and I play soccer whenever the weather is not cloudy.

c. Give the contrapositive in English for the following statement using unless
$\neg r \wedge \neg s \rightarrow \neg p \vee q$

5- Let

A(x): “x is athletic”

B(x): “x is fat”

P(y): “y is protein food”

Q(y): “y is fatty”

E(x,y): “x eats y”

The domain for x is the set of all people and y is the set of all food. Assume chicken is a protein and pizza is a fatty food. Answer the following:

a. Write a symbolic of: “All athletic and not fat people eat some protein food”

b. Write the English of: $\exists x \forall y: A(x) \wedge B(x) \wedge P(y) \rightarrow \neg E(x,y)$

c. Write the symbolic of: “Some athletic people eats pizza”

d. Write in English (without starting by not ..) of:
$\neg \forall x \forall y: A(x) \wedge \neg P(y) \rightarrow \neg E(x,y)$

6- Let x and y be the real numbers and P(x, y) denotes "x + y = 0."

Find the truth values of

$1 - \ \forall x \forall y: P(x, y)$

$2 - \ \forall x \exists y: P(x, y)$

$3 - \ \exists x \forall y: P(x, y)$

$4 - \ \exists x \exists y: P(x, y)$

7- Show that the following argument is valid:

$q \wedge \neg s \rightarrow \neg p$

$p \vee s$

$\neg q \rightarrow \neg t$

$\neg s$

$\therefore \neg t \vee s$

8- Show that the following argument is valid:

$\neg p \wedge q$

$r \rightarrow p$

$\neg r \rightarrow s$

$s \rightarrow t$

$\therefore t$