HW1 (Corrections) (CSCI-C241)

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- Question Two
  - 2f
    P = Participants were timed on this task
    Q = Most finished in less than 8 minutes
    $\neg P \wedge Q$
  - 2j
    P = The people will give up their arms
    Q = The tyrant resigns
    R = We get our money back
    $P \rightarrow (Q \wedge R)$
  - 2k
    P = The Lyapunov function exists
    Q = The system is stable
    $P \leftrightarrow Q$
  - 2l
    P = The Turing Test was passed
    Q = The individal is intelligent
    $P \rightarrow Q$
  - 2m
    P = There are no antibodies in the subject's body
    Q = The subject is susceptible to an infection
    $P \rightarrow \neg Q$
  - 2n
    P = Disciplinary knowledge is used
    Q = Organizational skills is used
    R = The teaching is considered effective
    $R \rightarrow (P \wedge Q)$
- Question Five

– 5c

The statement is not a contradiction as shown in the following truth assignment:

X = false

$X \rightarrow \neg X = false \rightarrow \neg false = false \rightarrow true = true$

– 5d

The statement is not a tautology as shown in the following truth assignment:

A = false

B = true

$\neg A \rightarrow \neg(A \vee B) = \neg true \rightarrow \neg(true \vee false) = false \rightarrow true = false$

– 5e

The statement is a contingency as shown in the following truth assignments:

1. A = true
   B = true
   $\neg A \rightarrow \neg(A \vee B) = \neg true \rightarrow \neg(true \vee true) = false \rightarrow false = true$
2. A = false
   B = true
   $\neg A \rightarrow \neg(A \vee B) = \neg false \rightarrow \neg(false \vee true) = true \rightarrow false = false$

– 5g

The statement is satisfiable as shown in the following truth assignment:

A = true

B = true

C = true

$((A \rightarrow B) \wedge (C \vee \neg B)) \rightarrow (A \rightarrow C) = ((true \rightarrow true) \wedge (true \vee false)) \rightarrow (true \rightarrow true) = (true \wedge true) \rightarrow true = true \rightarrow true = true$

– 5i

The statement is not a contradiction as shown in the following truth assignment:

A = true

B = true

$(A \rightarrow B) \rightarrow (\neg A \rightarrow \neg B) = (true \rightarrow true) = true$

– 5j

The statement is not a tautology as shown in the following truth assignment:

A = false

B = true

$(A \rightarrow B) \rightarrow (\neg A \rightarrow \neg B) = (false \rightarrow true) \rightarrow (true \rightarrow false) = true \rightarrow false = false$

– 5k

The statement is satisfiable as shown in the following truth assignment:

A = false

B = true

C = false

D = true

$\neg A \vee ((D \vee \neg D) \rightarrow ((B \wedge \neg B) \leftrightarrow (C \rightarrow C))) = \neg false \vee ((true \vee \neg true) \rightarrow ((true \wedge \neg true) \leftrightarrow (false \rightarrow false))) = true \vee (true \rightarrow (false \leftrightarrow true)) = true$