King Saud University	College of Sciences	Department of Mathematics
Section (4997)	Quiz 1 CSC 281	Semester 2 (1447 H)

Name:..... Student Number:.....

The examination contain 2 pages.

Question 1: (1 mark) Determine the truth value of each the following propositions.

Proposition	**Truth value**
$(-1+2=5)$if and only if $(-7>0)$	
$(1>5)$ only if $(7<2)$	
If $(3+1=4)$ or $(2+3=6)$, then $(2+4=6)$ and $(5+2=8)$	
$(3=-3)$ whenever $(3=3)$	

Question 2: (1 mark) Give the correct answer in the following cases:

The conditional statement	**is the ...**
	converse of $p \to q$
	inverse of $p \to q$
	contrapositive of $p \to q$
	contrapositive of $\neg q \to p$

Question 3: (2 marks) Let $P(x, y)$ be the predicate "$x + 3y = 4x$. Determine the truth value of each the following statements.

Statement	**Truth value**
$P(1,1)$	
$\exists x \in \mathbb{Z}, P(x,1)$	
$\forall x \in \mathbb{Z}, \exists y \in \mathbb{Z}, P(x,y)$	
$\exists x \in \mathbb{Z}, \exists y \in \mathbb{Z}, P(x,y)$	
$\forall x \in \mathbb{Z}, \forall y \in \mathbb{Z}, P(x,y)$	
$\exists x \in \mathbb{Z}, \forall y \in \mathbb{Z}, P(x,y)$	

Question 4: (1 mark) Find the negation of the following propositions:

1. "$\forall x \in \mathbb{R}, \forall y \in \mathbb{R}$ (if $x > 0 \wedge y > 0$, then $x.y > 0$)".
   Answer:

2. "$\forall x \in \mathbb{R}, \exists y \in \mathbb{R}$ $(x \star y = 0)$".
   Answer:

3. "$\exists x \in \mathbb{R}$, $\forall y \in \mathbb{R}$ $(x \star y = y)$".
   Answer:

Solutions

Question 1: (1 mark) Determine the truth value of each the following propositions.

Proposition	**Truth value**
$(-1+2=5)$ if and only if $(-7>0)$	True
$((1>5)$ only if $(7<2)) \equiv ((1>5) \to (7<2)))$	True
If $(3+1=4)$ or $(2+3=6)$, then $(2+4=6)$ and $(5+2=8)$	False
$((3=-3)$ whenever $(3=3)) \equiv ((3=3) \to (3=-3))$	False

Question 2: (1 mark) Give the correct answer in the following cases:

The conditional statement	**is the ...**
$q \to p$	converse of $p \to q$
$\neg p \to \neg q$	inverse of $p \to q$
$\neg q \to \neg p$	contrapositive of $p \to q$
$\neg p \to q$	contrapositive of $\neg q \to p$

Question 3: (2 marks) Let $P(x, y)$ be the predicate "$x + 3y = 4x$. Determine the truth value of each the following statements.

Statement	**Truth value**
$P(1,1) : 1 + 3(1) = 4(1)$	True
$\exists x \in \mathbb{Z}, P(x, 1)$	True
$\forall x \in \mathbb{Z}, \exists y \in \mathbb{Z}, P(x, y)$	True
$\exists x \in \mathbb{Z}, \exists y \in \mathbb{Z}, P(x, y)$	True
$\forall x \in \mathbb{Z}, \forall y \in \mathbb{Z}, P(x, y)$	False
$\exists x \in \mathbb{Z}, \forall y \in \mathbb{Z}, P(x, y)$	False

Question 4: (1 mark) Find the negation of the following propositions:

1. "$\forall x \in \mathbb{R}, \forall y \in \mathbb{R}$ (if $x > 0 \wedge y > 0$, then $x.y > 0$)".
   Answer: $\exists x \in \mathbb{R}, \exists y \in \mathbb{R}$ ($(x > 0 \wedge y > 0) \wedge x.y \leq 0$)
2. "$\forall x \in \mathbb{R}, \exists y \in \mathbb{R}$ $(x \star y = 0)$".
   Answer: $\exists x \in \mathbb{R}, \forall y \in \mathbb{R}$ $(x \star y \neq 0)$
3. "$\exists x \in \mathbb{R}$, $\forall y \in \mathbb{R}$ $(x \star y = y)$".
   Answer: $\forall x \in \mathbb{R}$, $\exists y \in \mathbb{R}$ $(x \star y \neq y)$