

King Saud University
Department of Mathematics

151
First Midterm, October 2015

NAME:

Group Number/Instructors's name:

ID:

Question	Grade
I	
II	
III	
IV	
Total	

Question	1	2	3	4	5	6
Answer						

I) Choose the correct answer (write it on the table above):

1) The truth value of the proposition " $10 - 1 = 8$ if and only if $3 + 2 = 1$ " is

(A) True	(B) False	(C) Undetermined	(D) None
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2) Let $P(x, y)$ be the statement " $y + x$ is a perfect square". Then

(A) $P(3, 2)$ is true	(B) $P(2, 2)$ is true	(C) $P(1, 1)$ is true	(D) None
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3) The converse of the statement "*If $x > 2$, then $x + 2 > x^2$* " is

(A) If $x + 2 > x^2$, then $x > 2$	(B) If $x \leq 2$, then $x + 2 \leq x^2$	(C) If $x + 2 \leq x^2$, then $x \leq 2$	(D) None
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4) If $A = \{1, 3, 5\}$ and $B = \{3, 4, 5\}$, then $|\mathcal{P}(A \cup B)|$ is

(A) 64	(B) 4	(C) 16	(D) None
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5) For any subsets A and B of the universal set, the set $\overline{A \cup B}$ is

(A) $\overline{A} \cap \overline{B}$	(B) $A \cap B$	(C) $\overline{A} \cup \overline{B}$	(D) None
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6) The negation of $\exists x \in \mathbb{R}(x > 2 \wedge x \leq 3)$ is

(A) $\exists x \in \mathbb{R}$ $(x \leq 2 \vee x > 3)$	(B) $\forall x \in \mathbb{R}$ $(x \leq 2 \wedge x > 3)$	(C) $\forall x \in \mathbb{R}$ $(x \leq 2 \vee x > 3)$	(D) None
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II) A) Without using truth tables, prove that $p \rightarrow (q \rightarrow r) \vee q$ is a tautology.

B) Is the following argument valid or invalid? Justify your answer.

$$\begin{array}{l} p \rightarrow q \\ q \rightarrow (p \rightarrow r) \\ p \\ \hline \therefore r \end{array}$$

III) Prove the theorem:

"If n is an integer number, then n is odd if and only if $5n + 3$ is even".

IV) A) Prove, by cases, that, for every real number x , the inequality $x \geq -|x|$ holds.

B) Prove that the statement " $n^2 - 7n + 10 \geq 0$, for all integer numbers n " is false.