MATH 122 (A02)
Date: Feb. 13, 2025

Quiz 2
Time Limit: 25 minutes

This quiz contains 4 pages (including this one, and a scrap page) and 6 questions.

Before starting your quiz, enter your name and student ID (clearly) on this page.

You may not open the quiz until instructed to do so. In the meantime, please read the following instructions:

- This quiz is closed-book. You are permitted a Sharp EL-510R series calculator (but you probably won't find it very useful).
- Please organize your work reasonably neatly in the space provided. Work that is scattered and difficult to follow, without clear ordering, will receive little credit.
- Unless otherwise specified, in order to receive full credit for a correct solution you must show your work. Unsupported answers will not receive full credit, even if they are correct.

Question:	1	2	3	4	5	6	Total
Points:	2	3	3	3	2	2	15

[2] 1. Check the appropriate circle to indicate whether each statement is true or false. You do not need to provide any reasoning.

	True	False	
(a)	◯	◯	The negation of $\exists\, x, p(x)$ is $\forall\, x, p(x)$.
(b)	◯	◯	If $\forall\, x, p(x)$ and $\exists\, x, q(x)$ are both true, then $\exists\, x, p(x) \wedge q(x)$ is true.
(c)	◯	◯	For the universe of integers, $\exists\, x, (x > 5) \rightarrow (x < 2)$.
(d)	◯	◯	If $\forall\ x, p(x) \vee q(x)$ is true, then $[\forall x, p(x)] \vee [\forall x, q(x)]$ is true.

[3] 2. Let the universe be $\mathbb{Z}$, and let $p(x)$ be the statement "x is divisible by 5". Consider the statement $\forall\, m, \exists\, n, p(m+n) \wedge \neg p(mn)$. Write out this statement in words, and determine its truth value.

[3] 3. Let n be an integer. Prove that if n is odd, then $n^2 + 5$ is even.

[3] 4. Let A, B, and C be sets. Using the laws of logic, known logical equivalences, and the definition of set operations, prove that $x \in (A \cap B) \cap C$ is logically equivalent to $x \in A \cap (B \cap C)$

[2] 5. Let A and B be sets. Prove that $A \setminus B \subseteq (A \cap B)^c$ using an argument that starts with "Let $x \in A \setminus B$...".

[2] 6. Check the appropriate circle to indicate whether each statement is true or false. You do not need to provide any reasoning. Let A and B be sets.

	True	**False**	
(a)	○	○	If $x \in B$, then $\{x\} \in \mathcal{P}(B)$.
(b)	○	○	The sets $A \setminus B$ and $B \setminus A$ are never equal.
(c)	○	○	If $x \in A$ and $x \in B$, then $A \subseteq B$.
(d)	○	○	For any sets A and B, $B \subsetneqq A \cup B$.

This page is for rough work only, and will not be graded.
If you have work on this page you want marked,
please indicate this next to the original question.