

MATH 122 (A02)

Date: Jan. 30, 2025

Quiz 1

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	2	3	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) ☐ ☐ If $(p \wedge q) \rightarrow r$ is false, then q is true.
- (b) ☐ ☐ If $\neg(p \rightarrow q)$ is true, then $q \rightarrow p$ is true.
- (c) ☐ ☐ It is possible for a statement and its negation to both be true.
- (d) ☐ ☐ The sentence “UVic is on an island.” is a statement.
- [3] 2. Use the laws of logic and known logical equivalences to show that $(p \vee q) \wedge \neg(p \wedge \neg q)$ is logically equivalent to q .

- [3] 3. Consider the statement “If it is snowing, then it is cold outside and it is cloudy.” Write the contrapositive, converse, and negation of this statement as sentences in straightforward English. You do not need to provide any reasoning.

(a) Contrapositive:

(b) Converse:

(c) Negation:

- [2] 4. Give a counterexample to show that the following argument is invalid. Briefly explain your reasoning.

$$\frac{\neg p \rightarrow q \quad q \vee r}{\therefore r \rightarrow \neg q}$$

- [3] 5. Use rules of inference and known logical equivalences to show the argument below is valid.

$$\frac{\neg q \rightarrow r \quad p \rightarrow \neg q \quad \neg r}{\therefore \neg p}$$

- [2] 6. 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 law of distributivity is one of the rules of inference.
- (b) ☐ ☐ If $s_1 \Rightarrow s_2$ then the truth table columns for s_1 and s_2 are the same.
- (c) ☐ ☐ If a premise in a logical argument is false, then the argument is invalid.
- (d) ☐ ☐ $(p \vee q) \wedge r$ is logically equivalent to $r \wedge (q \vee p)$.

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.