

Mid-term 1 Exam: CSC 281

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Student Name:

Student Number:

Exercise 1

Determine whether $(p \rightarrow q) \wedge (\neg p \rightarrow q)$ is equivalent to q .

Exercise 2

Let $A = \{a, b\}$, $B = \{x, y\}$, and $C = \{0, 1\}$. Find:

- $A \times B$
- $A \times A$
- $A \times B \times C$
- $A \times A \times A$

Exercise 3

Knowing that $a \rightarrow b \equiv \neg a \vee b$

- Write the contrapositive, converse, and inverse of the following statement: $(x > 0 \wedge y < 0) \rightarrow (x \times y < 0)$.
- Write the negation of the following statement:

$$\forall x \in \mathbb{R} : x > 0 \rightarrow x^3 > 0$$

.

Let $P(X)$ denote the statement " $x \leq 4$ ", what are the truth values of the followings:

- $P(0)$
- $P(4)$
- $P(6)$

Exercise 4

1. Prove the following theorem: For all integers n , if n^2 is odd, then n is odd.
2. Suppose that $p \rightarrow q$ is known to be false. Give the truth values for
 - $p \wedge q$
 - $p \vee q$
 - $q \rightarrow p$

Exercise 5: Given the function $F = \{(a, 2), (b, 1), (c, 2), (d, 1), (e, 2)\}$

- What is the Domain of F ?
- What is the Image of F ?
- What is the Inverse function of F ?
- Is F^{-1} a function? Why ?