

MTH 3318 - Test #2

FALL 2023

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Name _____

Instructions. Fully document your work.

1. In exercises 1.a - 1.d, let p be the statement: "It is warm out," and let q be the statement: "We will go golfing." Write each statement in symbolic form.

(a) If it is warm out, then we will go golfing.

(b) It will be warm out or we will not go golfing.

(c) Being warm out is a necessary and sufficient condition for me to go golfing.

(d) It will be warm out if I go golfing.

2. In exercises 2.a - 2.d, let p be the statement: "I will get a job," and let q be the statement: "I will be broke." Write each statement in words.

(a) $p \vee q$

(b) $p \wedge q$

(c) $p \rightarrow \sim q$

(d) $\sim p \leftrightarrow \sim q$

3. In problems 3.a - 3.d, determine whether the given propositions are True or False:

(a) If $8 > 3$, then $8 > 10$.

(b) If $8 > 3$, then $8 > 5$.

(c) If $8 > 10$, then $2 + 4 = 6$.

(d) If $2 + 2 = 5$, then $8 > 10$.

4. In exercises 4.a-4.b construct a truth table for the statement given.

(a) $(p \vee q) \longleftrightarrow r$

(b) $\sim p \wedge (q \rightarrow (\sim r))$

5. For problems 5.a - 5.d, negate the given statements:

(a) All bats drink milk.

(b) Some dogs play poker.

(c) No one can blow smoke rings from their ears.

(d) \exists a real number x , \forall real numbers y , $x + y = y$.

(i.e. There exists a real number x , such that for all real numbers y , $x + y = y$.)

6. For problems 6.a - 6.b, disprove the given statements by providing a suitable counter-example:

(a) If $2n$ is even, then n is also even.

(b) If x is a factor of $(y + z)$, then x is a factor of y and x is a factor of z .

7. In problems 7.a - 7.d, determine whether the given arguments are valid.

(a) $(p \leftrightarrow q) \wedge (q \vee r) \therefore (p \rightarrow r)$

(b) Some birds fly. All things that fly consume gasoline. Therefore, some birds consume gasoline.

(c) If I shine my shoes and I comb my hair, then I will get a date. I will get a date. Therefore, if I don't shine my shoes, then I comb my hair.

(d) All squares are rectangles. Some triangles are rectangles. Therefore, some squares are triangles.

8. Give the converse and the contrapositive of the following statement:

(a) If $x = 2$, then $f(x) = 5$.