

MTH 3318 - Test #2

SPRING 2024

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Name _____

Instructions. Fully document your work.

1. In exercises 1.a - 1.d, let p be the statement: "He pays me," and let q be the statement: "I will do the work." Write each statement in symbolic form.

(a) If he pays me, then I will do the work.

(b) He will pay me, or I will not do the work.

(c) His paying me is a necessary and sufficient condition for me to do the work.

(d) He will pay me if I do the work.

2. In exercises 2.a - 2.d, let p be the statement: "I will buy new clothes," and let q be the statement: "I will look good." Write each statement in words.

(a) $p \wedge q$

(b) $p \vee q$

(c) $q \rightarrow \sim p$

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

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

(a) If $8 + 3 = 9$, then $8 > 10$.

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

(c) If $8 > 10$ if and only if $2 + 2 = 5$.

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

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

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

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

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

(a) All kids have freckles.

(b) No men snore.

(c) Some flowers have nectar.

(d) \forall real numbers x , \exists real number y , $\exists y = \frac{1}{x}$.

(i.e. For all real numbers x , there exists a real number y such that $y = \frac{1}{x}$.)

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

(a) $\forall n \in \mathbb{N}$, 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. Write the converse, inverse, and contrapositive of the following statement, labeling each one.

If I turn the key, then the car will start.

8. In problems 8.a - 8.b, determine whether the given arguments are valid.

(a) I will make him a partner if and only if he closes this deal. If he leaves tonight, then he will close this deal. Therefore, I will make him a partner if he leaves tonight.

(b) Some dolphins are fish. All fish taste good. Therefore, some dolphins taste good.

9. In problems 9.a - 9.b, determine whether the given arguments are valid.

(a) If I eat right and I exercise, then I will make the team. I will make the team.
Therefore, if I don't make the team, then I don't eat right.

(b) No squares are rectangles. Some triangles are squares. Therefore, some triangles are not rectangles.