BBM 205, Spring 2015 11.3.2015 Name: P: You get an A of the Wall exam q: You do every exortise in this book (2 pts) 1. The notation 31x P(x) denotes in A no top not in los pol l'There exists a unique x such that P(x) is true. What are the truth values of these statements? a) You get on A in this class (x) 9 x E (= (x) 9 x !E (avery exercise in this back. (x) 9 x!E (- (x) 4 x V (d) b) You get an A on the that exam you do every exercise (2 pts) 200 200 200 1 1 1 n is a positive integer, then n is even if and enty if Thether is even. A no to other an A on the time exam. d) Getting on A on the trial exam and doing every exercise in this book is sufficient for getting on A in this class. 4. Show that this conditional statement is a tautislogy by using truth table: (bVd) = (bbd)

3. Let pig and r be the propositions P: You get an A on the final exam q: You do every exercise in this book r: You get on A in this relax (x) 1 x. E rottation solt.

write these propositions using pig and rand logical What are the truth values of these sovitsonnos!

NO.Me .

- a) You get an A in this class, but you do not do every exercise in this book. (2) 9 x!E = (x) 9 x V (d
- b) You get an A on the final exam you do every exercise in this book, and you get on A in this class.
 - c) To get an A in this class, it is necessary for you to get an A on the final exam.
 - d) Getting on A on the final exam and doing every exercise in this book is sufficient for getting on A in this class.

a)

4) 7)

(2 pts) 4. Show that this conditional statement is a tautology by using truth table: $(p \land q) \rightarrow (p \rightarrow q)$

All pt) to state the converse contrapositive and inverse of (194 l).

5. Prove that if x is rational and x to then

these conditional statements.

a) When I stay up late it is landitionary situat x steep

until noon.

b) A positive interger is a prime only if it has

no divisors other than I and itself.

(3 pts)

6. Determine the truth value of the statement $\forall x \exists y (xy=1)$

if the domain for the variables consists of

a) the nonzero real numbers

b) the nonzero integers

c) the positive real numbers.

(3pls)

8. Let B(x) be the statement "x+1>2x". If the domain gensiats of all integers, what are these truth values?

 (3pts)

- 7. State the converse, contrapositive, and inverse of each of these conditional statements? 21 x 7 toll and ??
 - a) When I stay up late, it is necessary that I sleep until noon.
 - b) A positive integer is a prime only if it has no divisors other than I and itself.

6. Determine the truth value of the statement \x34(x4=1) dornain for the variables consists of of the a) the nonzero real numbers b) the nonzero integers of the positive real numbers.

(3pts) 8. Let Q(x) be the statement "x+1>2x". If the domain consists of all integers, what are these truth values?

- a) Q(-1)
- b) 8(1)
- c) $\forall x 10(x)$

- (x) & x E (b
- e) \(\forall x \rightarrow (x) \rightarrow \forall x \rightarrow (x) \)

(2 pts)

9. Find a counterexample, if possible, to these universally quantified statements, where the domain for all variables consists of all real numbers.

a) $\forall x (\dot{x}^2 \neq x)$ b) $\forall x (|x| > 0)$ c) $\forall x (\dot{x}^2 \neq 2)$