

## Worksheet 10/9/2024

### Logical rules:

#### Negation

p	not p
T	F
F	T

#### AND

p	q	p and q
T	T	T
T	F	F
F	T	F
F	F	F

#### OR (inclusive OR)

p	q	p or q
T	T	T
T	F	T
F	T	T
F	F	F

#### If...then...

p	q	If p, then q
T	T	T
T	F	F
F	T	T
F	F	T

#### XOR (exclusive OR)

p	q	p xor q
T	T	F
T	F	T
F	T	T
F	F	F

For Problems 1-8, determine the form of the logical connector (AND, OR, If...then...) State p and q. Then determine whether the proposition is true or false.

1. Dogs are animals and oak trees are plants.
2. 5 is greater than or equal to 4.
3.  $1 + 2 = 3$  and  $2 \times 3 = 5$ .
4. Not all men are tall and not all women are short.
5. Elephants are animals or elephants are plants.
6. If trees can walk then birds wear wigs.
7. If  $1 = 2$  then  $3 = 5$ .
8.  $2 = 2$  or  $2 = -2$ .

For Problems 9-12, make a truth table for the given statement. Assume that p, q, r are propositions.

9. p and (not p)

10.  $p$  or (not  $p$ )

11.  $p$  or  $q$  or (not  $q$ )

12.  $p$  or ( $q$  and  $r$ )

13. Make a truth table for the following statements and determine whether the two statements are logically equivalent.

$(p$  and  $q)$  or  $r$

$p$  and ( $q$  or  $r$ )