

2.1 Intro to Logic Cont'd

$p \wedge q$: p and q

$p \vee q$: p or q (INCLUSIVE OR)

$p \oplus q$: p or q, but not both
(EXCLUSIVE OR)

$\sim p$: not p

Ex: I drank coffee today.
Did I drink coffee or tea today?
YES

Ex: I drank coffee today.
Did I drink coffee and tea today?
MAYBE

Ex: I drank coffee or tea today.
Did I drink coffee today?
MAYBE

Ex: p = "Pumpkins are a fruit."
q = "Quarters are round."
Translate to logic.

a) Either pumpkins are a fruit or quarters are round.

$$p \vee q$$

b) Either pumpkins are a fruit or quarters are round, but not both.

$$p \oplus q$$

c) Pumpkins aren't a fruit or quarters aren't round.

$$\sim p \vee \sim q$$

d) It is not true that pumpkins are a fruit or quarters are round.

$$\sim (p \vee q)$$

e) It is not true that pumpkins aren't a fruit.

$$\sim(\sim p)$$

Ex: Translate to English.

$p =$ "Pumpkins are a fruit."

$q =$ "Quarters are round."

f) $p \wedge \sim q$

Pumpkins are a fruit and quarters aren't round. ✓

Pumpkins are a fruit but quarters aren't round. ✓

g) $q \oplus \sim p$

Quarters are round or pumpkins aren't a fruit,
but not both.

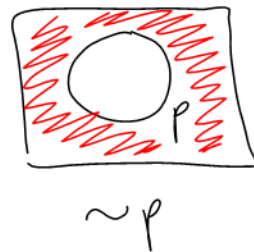
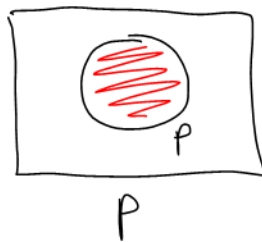
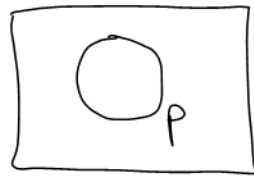
$$h) (q \wedge \sim p) \vee \sim q$$

Either quarters are round and pumpkins aren't a fruit
or quarters aren't round.

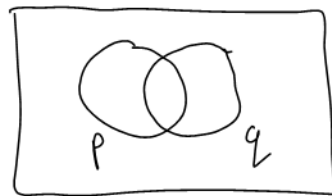
2.2 Venn Diagrams

A way to visualize logical propositions.

Venn diagram with 1 proposition.

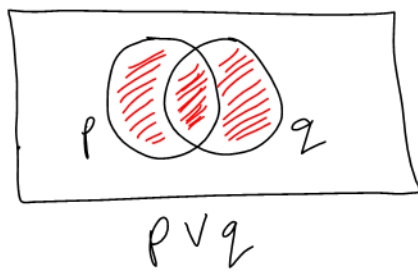


Venn diagram with 2 propositions.

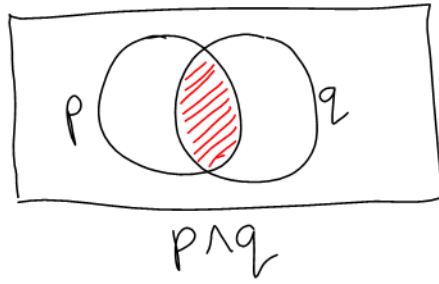


Ex: Draw the Venn diagram for:

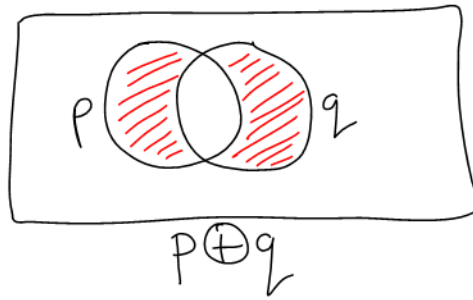
a) $p \vee q$



b) $p \wedge q$



c) $p \oplus q$



d) $\sim p$

