A nouncements

1) HW I due next Tuesday

Notation: (R, Q, Z, N)

$$IN = natural numbers$$

 $I, a, 3, 4, ...$
 $Z = IN$ along with its negatives
and zero
 $-a, -1, 0, 1, a, ...$
 $Q = all quotients a with$
 a, b in Z and $b \neq 0$
 $IR = all real numbers$

Statements

(Section 1.1)

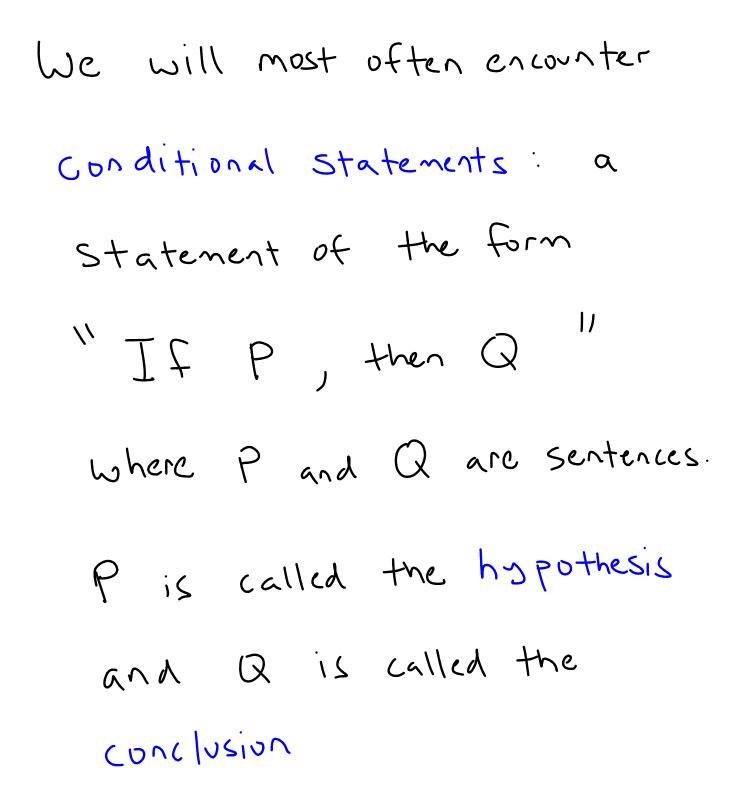
A statement (or proposition) Will be a declarative sentence that is either true or false, but not both.

Example 1:

a) "Professor Wiggins weighs 300 pounds" is a statement.

not a statement

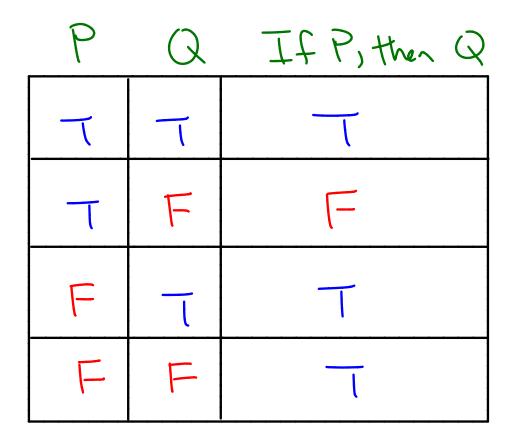
Our main goal will be learning how to decide whether statements are (provably) true or (provably) false. Special emphasis will be placed on catching lies!



Example 2:

a) "IF Rafael Nadal Wins the US Open, then he will be the number-one ranked tennis player" is a conditional statement.

You can see how the validity of P and Q affect a conditional Statement using a truth table.



T'' = TrueF'' = False

Example 3: Take

If both "n is an even prime"
and "
$$n=a^{11}$$
 are true, then
this statement is true.
If n can be an even prime
but n ta, this statement
is false.

the interesting part is: what if n is not an even prime number? Then we can conclude anything we want using "If n is an even prime number 11 as our hypothesis. This makes the conditional into what is called a vacuously true statement: it is true, but has no content.

Class Moral: When you are

trying to prove a statement, never assume the conclusion! Direct Proofs (Section 1.2)

In time, we will discuss strategies for proving statements to be true or false. When you have none of these, you go for a direct proof - straight from the hypothesis using agreed-upon results!

Notation: 272 = even integers.

An integer m is even if
there is an
$$nin \mathbb{Z}$$
, $m = 2n$.

$$\mathbb{Z} - \mathbb{Q}\mathbb{Z}$$
 will be the odd
integers. An integer k is
odd if there is an n in \mathbb{Z}_{j}
 $\mathbb{Q} = \mathbb{Q}_{n+1}$.

Proof: Let N be a natural
number. The next consecutive
number is
$$n+1 \cdot Now$$
 Galculate
the difference between the
squares:
 $(n+1)^2 - n^2 = n^2 + 2n + 1 - n^2$
 $= 2n + 1$ which
is odd. Not quite enough!

 $\sqrt{2} - (v+1)_{g} = v_{g} - (v_{g} + gv+1)$ $= n^{2} - n^{2} - 2n - 1$ = -2n - 1Not quite of the form we want, but easily fixed. -2n-1 = 2(-n-1/2)= 2(-n-1+1-1/2)= 2(-n-1+1/2)= 2(-n-1) + 1

Write something to let people know your proof is finished!