Discrete 9/9

Prime number Peter

Pi (π) Vlada

exponential (e) → Alex.

gravitation (g $\begin{cases} 9.8 \\ 32.2 \end{cases}$)

Integration → William

$$\forall x \in \mathbb{Z}^+, \forall y \in \mathbb{Z}^+, \ x+y > 0$$

$\mathbb{R}$: real numbers

$\mathbb{R}^+$: " positive #

$\mathbb{R} - \{0\}$ $\boxed{(x \neq 0, \ x \in \mathbb{R})}$

$$\forall x \ (C(x) \ \underline{\vee} \ \exists y \ (C(y) \ \underline{\wedge} \ F(x,y)))$$

$C(x)$: x ha a computer

$F(x,y)$ x & y are friends

x & y students in school.

For every student x in your school, ($\forall x$)

x has a computer $\underline{\text{or}}$ there is a

student y such that y has a computer
($\exists$)
and x and y are friends.

every student has a computer or has a friend who has a computer.

Everyone has exactly one best friend.

$\forall x$ (person has ex. 1 b. friend)

y is best friend x : $B(x,y)$

z, is not best friend of x :

$$\exists y\ \big(B(x,y) \wedge \forall z(z \neq y \rightarrow \neg B(x,z))\big)$$

$$\forall x\ \exists y\ (B(x,y))$$

$$\neg \forall (x)\ P(x) = \exists x\ \neg P(x)$$

$$\neg \exists (x)\ P(x) = \forall x\ \neg P(x)$$

not

conjugate

$\forall = \neg \exists$

$$\neg \forall x\ \exists y\ (xy = 1) = \exists x \neg (\exists y\ (xy=1))$$

$$= \exists x\ \forall y\ \neg (xy = 1)$$

$$= \exists x\ \forall y\ (xy \neq 1)$$

$\neg(\forall x \exists y \forall z P(x,y,z))$

$= \exists x \forall y \exists z \neg P(x,y,z)$

Intro to Proofs

Theorem $\to$ statement is true

Proof $\nearrow$ is true.

axioms.

Propositions

Direct proofs

$p \to q$

$F \to F$ T

$F \to T$ T

p is false $\Rightarrow$ statement always True

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if n is an odd integer, then n^2 is odd.

Proof n is an odd $\Rightarrow n = 2\underbrace{k}+1$

$(\forall k \in \mathbb{Z})$

$n^2 = (2k+1)^2$

$= 4k^2+4k+1$

$= 2(2k^2+2k)+1$;

let: $k = 2n^2 + 2n$

$= 2k + 1$ is odd.

By the defn n is an odd integer then n^2 is an odd.

$p \to q$ contraposition

$\neg q \to \neg p$

Ex $n \in \mathbb{Z}$, $3n+2$ is odd $\Rightarrow n$ odd

$3n+2 = 2k+1$

$3n = 2k-1$

$n = \frac{2}{3}k - \frac{1}{3}$??

n even $\Rightarrow 3n+2$ is even.

n even $\Rightarrow n = 2k$

$3n+2 = 3(2k)+2$

$= 6k+2$

$= 2(3k+1)$ even.

$\Rightarrow 3n+2$ is odd $\Rightarrow n$ is odd