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abderhab

Jun 11-9:10 AM

- $2+3=7$ (P)
- $x+y=y+x$ for all $x,y \in \mathbb{R}$ (P)
- 2^n+n is a prime number (P)
- why is logic important?
- Knock before entering
- $x-y=y-x$

Jun 11-9:16 AM

[$\underbrace{\text{number 4 is positive}}_{p}$ and $\underbrace{\text{number -3 is negative}}_{q}$]

$(p \wedge q)$

- if $\underbrace{n \bmod 2 = 0}_{p}$, then $\underbrace{n \text{ is even number}}_{q}$

$p \rightarrow q$

- It is not true that $\underbrace{3 \text{ is even}}_{p}$ or $\underbrace{7 \text{ is a prime}}_{q}$

$\neg(p \vee q)$

Jun 11-9:27 AM

$(p \wedge q \wedge r)$

$\Downarrow$

$((p \wedge q) \wedge r)$

p	q	r	$p \wedge q$	r	$p \wedge q \wedge r$
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

Jun 11-9:38 AM

$p \rightarrow p$

p	$p \rightarrow p$
F	T
T	T

if $p \leftrightarrow q$ is tautology

$p \Longleftrightarrow q$

$p \rightarrow q$ is tautology

$p \Longrightarrow q$

Jun 11-9:51 AM

SAT : $1 \longrightarrow 3$
SUN : $9 \longrightarrow 12$
MON : $1 \longrightarrow 3$
TUE : $9 \longrightarrow 12$
WED : $1 \longrightarrow 3$

Jun 11-10:08 AM

$n^2 + 2n$

n is even number

$n = 2m$ where m is integer

$(2m)^2 + 2(2m) =$

$4m^2 + 4m = \cancel{\text{even}}$,

$4(m^2 + m)$

n is odd number

$(2m+1)^2 + 2(2m+1)$

$4m^2 + 4m + 1 + 4m + 2$

Jun 11-10:18 AM

P(n) "$n^2 + 2n$ is odd"

n is an integer

$\forall n\ P(n)$: true or not

n can be odd or even.

if n is even $n = 2K$

$(2K)^2 + 2(2K)$ Even

$\exists n$: P(n) is even

and hence P(n) is not true for all $n \in D = \{\text{integer numbers}\}$

P(n) : $n^2 + 2n$ is odd

for example $n = 0$ $P(n) = 0$

Jun 11-10:23 AM

P(X) : "x is even"

$x \in \{0, 1, 2, \dots\}$

$\exists x\ P(x)$

Jun 11-10:56 AM

prove that the sum of three consecutive integers is always divisible by 3.

$D = \{0, 1, 2, \dots\}$

$\forall x \in D$: x mod 3 = 0 OR x mod 3 = 1 OR x mod 3 = 2

$x + (x+1) + (x+2)$

$3x + 3 = 3(x+1)\ \forall x \in D$.

Jun 11-10:58 AM

prove that:

the product of two odd numbers is always odd.

$(2K+1)(2l+1)$

$4Kl + 2K + 2l + 1$ is odd

$2(2Kl + K + l) + 1$

$2K' + 1$

Jun 11-11:16 AM

prove that.

$n^2 - 2$ is not divisible by 5 for any positive integer n.

Jun 11-11:21 AM

$\forall n \in \{0, 1, 2, 3, 4, 5, \ldots\}$

$\forall n \in \begin{cases} n \bmod 5 = 0 & n = 5K \\ n \bmod 5 = 1 & n = 5K+1 \\ n \bmod 5 = 2 & n = 5K+2 \\ n \bmod 5 = 3 & n = 5K+3 \\ n \bmod 5 = 4 & n = 5K+4 \end{cases}$

Jun 11-11:34 AM

$n^2 - 2$

$*(5K)^2 - 2 = 25K^2 - 2$

$= 5(5K)^2 - 2$

$= 5K' - 2$

$*(5K+1)^2 - 2 = 25K^2 + 10K + 1 - 2$

$= 25K^2 + 10K - 1$

$= 5(\underline{5K^2 + 2K}) - 1$

Let $L = (5K^2 + 2K)$

$(5K+1)^2 - 2 = 5L - 1$

$\forall n$ $n^2 - 2$ is not divisible by 5

Jun 11-11:39 AM