prove that
$n^2 - 2$ is not divisible by 5 for any positive integer $n > 0$

Jun 16-9:07 AM

prove that
if $(m + n \geq 73)$ ← p
then $(m \geq 37$ or $n \geq 37)$ ← q

$(m = \{0, \ldots, 36\}$
$n = \{0, \ldots, 36\}$

$p \to q$
$\neg q \to \neg p$
$(m < 37$ and $n < 37) \to$
$m + n < 73$
$36 + 36 = 72 < 73$
$p \to q$ TRUE

Jun 16-9:15 AM

IF this entry is the last (p), then the table is full (q)

$$\begin{array}{l} p \to q \\ p \\ \hline \therefore q \end{array}$$

Therefore

Jun 16-9:26 AM

1. $L \to F$
2. $F \to M$
3. $\neg M$

$\therefore \neg L$

1. $L \to M$

$$\begin{array}{l} \neg M \\ \hline \neg L \end{array}$$

Jun 16-9:34 AM

$$\begin{array}{l} B \vee S \to P \\ B \wedge S \\ \hline P \end{array}$$

$$\begin{array}{l} p \wedge q \\ \hline p \end{array}$$

$$\begin{array}{l} p \\ \hline p \vee q \end{array} \qquad \begin{array}{l} p \to q \\ p \\ \hline q \end{array}$$

1. $B \wedge S$
2. B
3. $B \vee S$
4. $B \vee S \to P$
5. P

Jun 16-9:37 AM

Ex 1:
List the elements in the following sets:
$\{1/n : n = 1, 2, 3, 4\}$
$\{n^2 - n : n = 0, 1, 2, 3, 4\}$
$\{2 + (-1)^n : n \in \mathbb{N}\}$

EX 2
List 5 elements in each of the following sets
- Σ^* where $\Sigma = \{a, b, c\}$
- $\{w \in \Sigma^* : \text{length}(w) \leq 2\}$ where $\Sigma = \{a, b\}$
- $\{w \in \Sigma^* : \text{length}(w) = 4\}$ where $\Sigma = \{a, b\}$

Jun 16-9:47 AM

$\{\frac{1}{1}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}\}$

$\{0^2 - 0 = 0,\ 0, 2, 6, 12\}$

$\{1, 3\}$.

$\{abc, bca, bc, ab, cb\}$

$\{a, b, bb, ab, ba, aa\}$

$\{aabb, abaa, baaa, abbb, abab\}$

Jun 18-9:26 AM

Ex 3

Determine the following sets

$\{n \in \mathbb{N} : n^2 = 9\}$

$\{x \in \mathbb{R} : x^2 = 9\}$

$\{n \in \mathbb{Z} : n^2 = 9\}$

$\{n \in \mathbb{N} : 3 < n < 7\}$

$\{n \in \mathbb{Z} : 3 < |n| < 7\}$

$\{x \in \mathbb{R} : x^2 < 0\}$

Jun 16-9:56 AM

- $\{3\}$
- $\{-3, 3\}$
- $\{-3, 3\}$
- $\{4, 5, 6\}$
- $\{-4, -5, -6, 4, 5, 6\}$
- $\{\}$

Jun 18-9:37 AM

Ex 4

Let $U = \{1, 2, 3, \ldots, 12\}$

$A = \{1, 3, 5, 7, 9, 11\}$

$B = \{2, 3, 5, 7, 11\}$

$C = \{2, 3, 6, 12\}$

$D = \{2, 4, 8\}$

Determine: $A \cup B$, $A \cap B$, $(A \cup B) \cap C^c$, $A \setminus B$, $C \setminus D$, $B \oplus D$

Jun 16-10:02 AM

$A \cup B = \{1, 3, 5, 7, 9, 11, 2\}$

$A \cap B = \{3, 5, 7, 11\}$

$A \cup B \cap C^c$

$C^c = \{1, 4, 5, 7, 8, 9, 10, 11\}$

$(A \cup B) = \{1, 2, 3, 5, 7, 9, 11\}$

$(A \cup B) \cap C^c = \{1, 5, 9, 11, 7\}$

$A \setminus B = \{1, 9\}$

$C \setminus D = \{3, 6, 12\}$

$B \oplus D = \{3, 4, 5, 8, 7, 11\}$

Jun 18-9:45 AM

$A \cap B = A \cap C \Rightarrow B = C$

$A \cap B = A \cap C =$ $B \neq C$

$A = \{1, 2, 3\}$

$B = \{2, 5, 6, 10\}$

$C = \{2\}$

$A \cap B = A$. $A \cap C =$

$A \cup B = A \cup C \Rightarrow B = C$ ($B \neq C$)

$A \cup B = A \cup C \Rightarrow B \neq C$

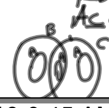
$A \{1, 2, 3\}$

$B \{1, 2\}$

$C \{1\}$

$A \subseteq B \cup C \Rightarrow A \subseteq B$

$A \subseteq C$



Jun 18-9:45 AM

Ex6

S={0,1,2,3,4}
T={0,2,4}

$|S| \times |T| = 15$

$|S \times T| = 15 = |T \times S|$

$\{(m,n) \in S \times T : m < n\}$
$= \{(0,2),(0,4),(1,2)$
$(1,4)(2,4)(3,4)\}$

$= \{(m,n) \in S \times S : m+n=10\}$

$\{\emptyset\}$

p	q	r	p∧q	(p∧q)→r
T	T	T	T	T
T	T	F	T	T
T	F	T	F	F
T	F	F	F	T
F	T	T	F	F
F	T	F	F	T
F	F	T	F	F
F	F	F	F	T

p	q	r	q∨r	¬p↔(q∨r)
T	T	T	T	F
T	T	F	T	F
T	F	T	T	F
T	F	F	F	T
F	T	T	T	T
F	T	F	T	T
F	F	T	T	T
F	F	F	F	F

p	q	r	¬(p∨q)	¬(p∧q)∧r
T	T	T	F	F
T	T	F	F	F
T	F	T	F	F
T	F	F	F	F
F	T	T	F	F
F	T	F	F	F
F	F	T	F	F
F	F	F	T	F

Jun 18-10:26 AM

Ex 5

The following statements are false. Give a counterexample

- $A \cap B = A \cap C \Rightarrow B = C$
- $A \cup B = A \cup C \Rightarrow B = C$
- $A \subseteq B \cup C \Rightarrow A \subseteq B$ OR $A \subseteq C$.

Jun 16-10:07 AM

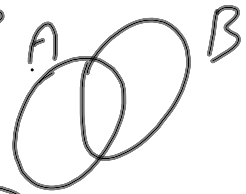
Ex 6

Let $S = \{0,1,2,3,4\}$
$T = \{0,2,4\}$

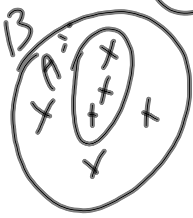
- How many ordred pairs are in $S \times T$? $T \times S$?
- List the elements in the set
$\{(m,n) \in S \times T : m < n\}$
$\{(m,n) \in S \times S : m+n=10\}$

Jun 16-10:13 AM

$A \not\subseteq B$



$A \subseteq B$



Jun 16-11:12 AM

Ex 7

Give the truth table of

$(p \wedge q) \rightarrow r$

$\neg p \leftrightarrow (q \vee r)$

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

Jun 16-10:18 AM

Ex 8

Give counterexample to:

- $n^3 < 3^n \ \forall n \in \mathbb{N}$
- $x > y \rightarrow x^2 > y^2 \ \forall x, y \in \mathbb{R}$

$n = 3$

$27 \not< 27$

$-2 > -3$

$-2^2 \not> -3^2$

$4 \not> 9$

Jun 16-10:21 AM

abderhab@ksu.edu.sa

Jun 18-11:00 AM