

HomeWork 1

question 1.

complete empty cells in the table:

p	q	$p \vee q$	$p \wedge q$	$p \rightarrow q$	$p \leftrightarrow q$
T	T	T	T	T	<input type="text"/>
T	F	T	<input type="text"/>	F	F
F	T	T	F	T	F
F	F	<input type="text"/>	F	T	<input type="text"/>

question 2.

State if expression below is tautology?

$$[(p \Rightarrow q) \wedge (q \Rightarrow r)] \Rightarrow (p \Rightarrow r)$$

yes/true

question 3.

Follow the proof and answer yes or no:

Try Again Hint Solution

4. Complete the following proof:

Prove by induction: $2^n > n^2$ for all $n \geq 5$

Proof:

Step 1: $n=1$

$$1^2 < 2^1 \quad \text{$$

Step 2:

Assume that it is true for $n=k$:

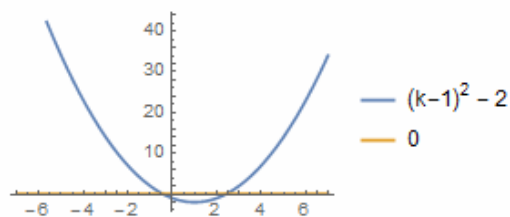
$$2^k > k^2 \quad (\bullet) \quad \text{$$

Prove that it is true for $n=k+1$:

$$2^{k+1} = 2^k \cdot 2 > \text{from } (\bullet) > 2k^2 > (k+1)^2 \quad \text{$$

The last inequality holds since

$$2k^2 - (k+1)^2 = (k-1)^2 - 2 > 0, \text{ whenever } k \geq 5. \quad \text{$$



question 4.

Analyze simplification and choose right answer:

$$[(p \wedge q) \vee q] \Rightarrow q \Leftrightarrow [q] \Rightarrow q$$

$$\Leftrightarrow$$

$$\Leftrightarrow q \vee \sim q$$

in some places we can
add a panel with options
to choose