$P_1 : p \to r$

$P_2 : \neg q \to p$

$P_3 : \neg r$

Argument

$(P_1 \wedge P_2 \wedge P_3) \to q$?

p	q	r	$P_1 : p \to r$	$P_2 : \neg q \to p$	$\neg r$	$P_1 \wedge P_2 \wedge P_3$
0	0	0	1	0	1	0
0	0	1	1	0	0	0
0	1	0	1	1	1	1
0	1	1	1	1	0	0
1	0	0	0	1	1	0
1	0	1	1	1	0	0
1	1	0	0	1	1	0
1	1	1	1	1	0	0

$p \to q \vee$

p

q

$\neg q$

$q \wedge \neg q \Rightarrow$ Fb ?!

$\neg p$

$\neg(r \wedge s) \equiv \neg r \vee \neg s$

$p \quad q \quad r \quad s \quad t$

P_1: $(\neg p \vee \neg q) \rightarrow (r \wedge s)$

P_2: $r \rightarrow t$

P_3: $\neg t$

C: $\therefore p$

Proof

Justification for writing the statement

Statement	Reason
1. $(\neg p \vee \neg q) \rightarrow (r \wedge s)$	Premise
2. $r \rightarrow t$	Premise
3. $\neg t$	Premise
4. $\neg r$	MT, lines 2,3
5. $\neg r \vee \neg s$	R.D.A, line 4
6. $\neg(r \wedge s)$	DeMorgan's Rule, line 5
7. $\neg(\neg p \vee \neg q)$	MT, lines 1, 6
8. $\neg\neg p \wedge \neg\neg q$	DeMorgan's Rule line 7
9. $p \wedge q$	R. Double Negation line 8
10. p	R. Conj. Simp line 9

$\neg p \leftrightarrow q$

$q \to r$

$\neg r$

$\therefore p$

Proof

Stmt		Reason
1.	$\neg p \to q$	Premise
2.	$q \to \neg p$	Premise
3.	$q \to r$	Premise
4.	$\neg r$	Premise
5.	$\neg q$	MT St. 3,4
6.	$\neg\neg p$	MT St 1,5
7	p	Double neg St 6

Stmt		ason
1.	$\neg p \to q$	Premise
2.	$q \to \neg p$	Premise
3.	$q \to r$.	Premise
4.	$\neg r$ ..	Premise
5.	$\neg p$	Assumption
6.	q	MP 1,5
7	r	MP 3,6
8.	$r \wedge \neg r = F_0$	R.o.C. 4,7
9.	p	Pr. by Contr. Lines 5–8 St

$\sqrt{2}$ is irr.

$\propto$ $\sqrt{2} = \frac{a}{b}$ $\gcd(a,b) = 1$

$a = \sqrt{2}\, b$

$a^2 = 2b^2$

$4k^2 = 2b^2$

$a = 2k$

$b = 2m$

F_0

~~48~~

$3 + \cancel{45}$ p c

$5 + 43$ p p

$7 + 41$ p p

$9 + 39$ c c

⋮

$\forall x$: for all

$\forall x$ where $x \in$ odd int.

x^2 is an odd int

$$\forall x \in O : x^2 \in O$$

$\exists$ there exists (for some)

$\exists x \in \mathbb{Z} : x^2 = 0$

$x = 0$

Goldbach Conj

$\forall x \in$ Even int > 2

— $\exists\, p, q \in$ Prime

such that $x = p + q$

$24 = 11 + 13$

$48 = 41 + 7$

The set of prime numbers is infinite.

$p_1 \quad\quad p_k$

$p_1 \cdots p_k + 1$

False

$\exists\, n \in E : n^2$ is odd.

$\Rightarrow n = 2k \Rightarrow n^2 = 4k^2 \in E$

—

$\boxed{\forall x \in E \quad x^2 > 1}$

$x = 0 \Rightarrow$ counter example