Supplemental Notes Week 3

$\sqrt{3}$ is irrational ; can we do the same proof ?

$$\sqrt{3} = \frac{a}{b}$$

$$3 = \frac{a^2}{b^2} \qquad 3b^2 = a^2 \qquad 3 \mid a^2 \overset{?}{\Rightarrow} 3 \mid a$$

yes: from the fundamental theorem of arithmetic* we can conclude if for a prime p, $p \mid a^2 \Rightarrow p \mid a$

Therefore, we can proceed as in the case of $\sqrt{2}$

* we will see it in Week 9

Conjunction, Implication and Distributivity

$$(p \wedge q) \to r \quad \overset{?}{\not\equiv} \quad (p \to r) \wedge (q \to r)$$

$$\equiv$$

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

$$\equiv$$

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

$$\equiv$$

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

$$\equiv$$

$$(p \to r) \vee (q \vee r)$$