

Tutorial 2 part 2

1. Prove the Following using direct proof.

- i. If a and b are odd integer, then $a+b$ is an even integer.
- ii. If a is number such that $a^2-7a+12=0$, then show that $a=3, a=4$.
- iii. Prove that if $|x| > |y|$ then $x^2 > y^2$

2. Prove the following using method of Contraposition.

- i. If $x^2 - 4 < 0$, then $-2 < x < 2$.

3. Prove the following using method of contradiction.

- i. Prove that $\sqrt{5}$ is not a rational number.
- ii. Prove that if $x^2 - 4 = 0$, then $n \neq 0$.

4. Find the counter example for if $a > b$ then $a^2 > b^2$.

5. Prove using mathematical induction that for all $n \geq 1$,

$$1 + 4 + 7 + \cdots + (3n - 2) = n(3n - 1) / 2 .$$

6. Consider the famous Fibonacci sequence $\{x_n\}_{n=1}^{\infty}$, defined by the relations $x_1 = 1$, $x_2 = 1$, and $x_n = x_{n-1} + x_{n-2}$ for $n \geq 3$.