# 1.4.1

Friday, February 3, 2017 5:54 PM

## 1.4 Proving Conjectures: Deductive Reasoning

When we make a conclusion based on statements that we accept as true, we are using **deductive reasoning**.

usually involves algebra

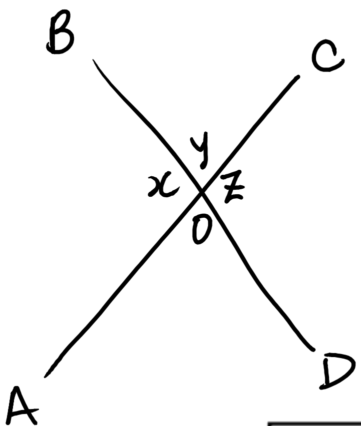
**Example 1:** Use deductive reasoning to prove that the product of an odd integer and an even integer is even.

Let the even integer be $2x$ ($x$ is an integer.)
+ the odd integer be $2y+1$ ($y$ is an integer.)

$\Rightarrow$ odd $\times$ even $= 2x(2y+1)$
$= 4xy + 2x$
$= 2(2xy + x)$
$= 2$(some #)

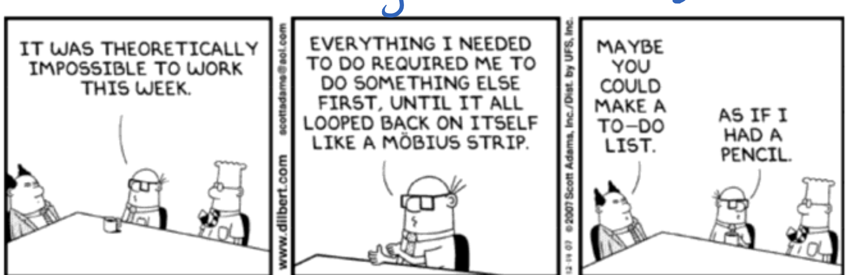
$\to$ 2 times any number will always be even.

**Example 2:** Use deductive reasoning to prove that opposite angles of intersecting lines are equal.




| | |
|---|---|
| $x + y = 180°$ | straight line |
| $z + y = 180°$ | straight line |
| $x + y = z + y$ | both $= 180°$ |
| $x = z$ | subtract '$y$' from both sides |

$\therefore$ $x$ and $z$ are opposite angles and they will always be equal.



subtract

one number and the one right after it

$x, x+1, x+2..$

**Example 3:** Use deductive reasoning to prove that the difference between consecutive perfect squares is always an odd number.

$x \cdot x = x^2$

Let $x$ and $x+1$ be the consecutive numbers.

prove $(x+1)^2 - x^2$ will always be odd.

$(x+1)(x+1) - x^2$

$= \cancel{x^2} + x + x + 1 - \cancel{x^2}$

$= 2x + 1$

This will always be odd because $2x$ is always even and adding 1 makes it odd.

**Example 4:** Weight-lifting builds muscle. Muscle makes you strong. Strength improves balance. Inez lifts weights. What can be deduced about Inez?

Inez → weight lifting → Builds muscle → strength → improved balance

$\boxed{\therefore \text{Inez builds muscle, improving his strength + balance.}}$

Assignment: pg. 31 #1, 2, 4-7, 10, 11, 15, 19

optional