

## 1 Theorem and lemma examples with title

### Theorem 1.1: Pythagoras' theorem

In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the catheti.

$$a^2 + b^2 = c^2$$

In mathematics, the Pythagorean theorem, also known as Pythagoras' theorem (see theorem 1.1), is a relation in Euclidean geometry among the three sides of a right triangle.

### Lemma 1.1: Bézout's identity

Let  $a$  and  $b$  be nonzero integers and let  $d$  be their greatest common divisor. Then there exist integers  $x$  and  $y$  such that:

$$ax + by = d$$

This is a reference to Bezout's lemma 1.1

## 2 Theorem and proof examples without title

### Theorem 2.1

There exist two irrational numbers  $x, y$  such that  $x^y$  is rational.

### Proof 2.1

If  $x = y = \sqrt{2}$  is an example, then we are done; otherwise  $\sqrt{2}^{\sqrt{2}}$  is irrational, in which case taking  $x = \sqrt{2}^{\sqrt{2}}$  and  $y = \sqrt{2}$  gives us:

$$\left(\sqrt{2}^{\sqrt{2}}\right)^{\sqrt{2}} = \sqrt{2}^{\sqrt{2}\sqrt{2}} = \sqrt{2}^2 = 2.$$

□

### 2.1

□

**Example 2.1**

jgkdljklg  $\hat{\beta}$

