Notes on Quantitative Finance

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1 Introduction

In this section, we review fundamental mathematical concepts relevant to quantitative finance.

1.1 Difference of Squares

The difference of squares formula states:

$$(a + b)(a - b) = a^2 - b^2. \tag{1}$$

This identity is useful in various proofs and factorizations.

1.2 Example: Proof that 899 is Not a Prime Number

A prime number is a natural number greater than 1 that is only divisible by 1 and itself. To determine whether 899 is prime, we check if it has factors other than 1 and 899.

Step 1: Choosing Close Factors We begin by approximating the square root of 899:

$$\sqrt{899} \approx 30.$$

We express 899 in the form of a difference of squares:

$$899 = 30^2 - 1^2.$$

Applying the identity:

$$899 = (30 - 1)(30 + 1) = 29 \times 31.$$

Step 2: Conclusion Since 899 can be expressed as a product of two integers greater than 1, it is not a prime number.