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Lesson 6   NON- vs NOT

When negating a concept in English, you have two options:

- Using **"not"** in a negative sentence.
- Using a prefix in a single word.

1. "Not"

"Not" is used to negate **a verb**, **an adjective**, or **an adverb**. When we use "not", we get a negative sentence.

Examples:

- **This is not correct.**
- **The number is not even.**

- **x is not a prime number.**
- **The function is not differentiable at x = 0.**
- **This equation does not have a real solution.**

2. "Non-"

"Non-" is a prefix meaning "not". It is used in some **adjectives** or **nouns** to **form the opposite**. When we use "non-", we get a positive sentence.

Examples:

- **Nonzero number** → A number that is not equal to zero.
- **Nonnegative number** → A number that is not negative, (i.e. it is ≥ 0).
- **Nonlinear equation** → An equation that is not linear.
- **Non-Euclidean geometry** → A type of geometry that does not follow Euclidean axioms.

Note: non- is not the only prefix used to form the opposite of a noun or an adjective, here are some examples:

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Logical → Illogical
Fair → Unfair
Possible → Impossible
Satisfied → Unsatisfied or Dissatisfied
Regular → Irregular

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3. Understanding the Difference Between "Not" and "Non-" (in Mathematics)

Most of the time, both forms are possible,

Example:

The set is **not empty**, meaning it contains at least one element. (Correct)

The set is **nonempty**, meaning it contains at least one element. (Correct)

- But in a lot of cases, **"non-" makes the sentence smoother and more natural**, because it keeps the sentence **positive** and avoids unnecessary negation.

Examples

✓ *We study **nonlinear differential equations**.*
✓ *We study differential equations that are **not linear**.* (Correct, but less natural)

✓ *We study **nonsingular matrices** in linear algebra.*

✓ *We study matrices that are **not singular** in linear algebra.* (Correct, but less common)

✓ *The equation has a **nontrivial solution**.*
✓ *The equation has a solution that is **not trivial**.* (Correct but wordy= **Correct mais alourdi**).

- We may also use non- when the sentence begins by "a" or "the", for example:

A **nonsingular** matrix is invertible. (instead of : A matrix that is not singular is invertible).

4. Some other adjectives and nouns that take non- in their opposites (in mathematics)

- **Nonzero number**

- **Nonnegative number**
- **Nonpositive number**
- **Noninteger**
- **Nonreal number**
- **Nonempty set**
- **Nonsingular matrix**

- **Nonlinear function/equation**
- **Nonhomogeneous equation**
- **Nonconstant function**

- **Non-Euclidean geometry**
- **Nonsymmetric matrix**
- **Nonconvex shape/set**

- **Nontrivial solution**
- **Noncommutative algebra**
- **Nonmeasurable set**
- **Nonreflexive relation**

5. Quick Exercise: Choose between "not" and "non-"

- The **……zero** matrix has at least one nonzero element.
- A **…….trivial** solution is the one we are looking for.
- The **…...degenerate** conic section is either an ellipse or a hyperbola.
- A **……decreasing** sequence can still have a limit.
- The equation is **…. solvable** using elementary methods.
- The limit is **….. defined** because the left and right limits are different.
- The series is **….. absolutely** convergent, but it is conditionally convergent.

Answers

- The **nonzero** matrix has at least one nonzero element.
  Instead of : The matrix that is not equal to zero has at least one element that is not equal to zero ! (Wrong formulation).
- A **nontrivial** solution is the one we are looking for.
- The **nondegenerate** conic section is either an ellipse or a hyperbola.
- A **nondecreasing** sequence can still have a limit.
- The equation is **not solvable** using elementary methods. (**not solvable=unsolvable**)
- The limit is **not defined** because the left and right limits are different. (**not defined=undefined**).
- The series is **not absolutely** convergent, but it is conditionally convergent. **(no opposite to absolutely, the negative form is necessary).**