VIII. Calculating limits:
i) *Plug-in* limits:

- We don't have problems in plugging the number into the limit (applying the value directly to the limit).

*Examples:*

1. \( \lim_{x \to 1} (4x^2 + 5x + 1) = 10 \)

2. \( \lim_{x \to 2} \frac{4x - 3}{2x-1} = \frac{5}{3} \)

*Mathematical inconsistencies.

ii) *Factoring* limits:

- We have problems (mathematical inconsistencies) in just applying the value directly to the limit.

*Examples:*

1. \( \lim_{x \to 1} \frac{x^3 - 1}{x - 1} = \lim_{x \to 1} x(x^2 + x + 1) = 3 \)

2. \( \lim_{x \to 2} \frac{x^3 - 3x + 2}{x - 2} = \lim_{x \to 2} (x-2)(x-1) = 1 \)

*Factoring techniques:

- \( a^2 - b^2 = (a+b)(a-b) \)
- \( a^2 + 2ab + b^2 = (a+b)^2 = (a+b)(a+b) \) or \( (a-b)(a-b) \)
- \( a^3 + b^3 = (a+b)(a^2 - ab + b^2) \)
- Extracting roots from polynomials: \( a(x-x_1)(x-x_2) \)