

Welcome to MAT137 - Calculus with proofs!

- Assignment 2 is due on October 15.
- Test 1 will be on October 23.
- “Practice” test on October 16.
- Check the website for details about the test.

- **Before next class:**
 - **Watch videos 2.21, 2.22**
 - Download next class slides.
No need to look at them.

Evaluate these limits.

$$1. \lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - 5x + 6}$$

$$2. \lim_{x \rightarrow 1} \frac{\sqrt{x+3} - 2}{x-1}$$

$$3. \lim_{x \rightarrow \infty} \frac{4x^3 + 2x^2 + 1}{5x^3 + 7x^2 + 7}$$

$$4. \lim_{x \rightarrow -\infty} \frac{x^2 + 3}{\sqrt{3x^4 + x^3}}$$

Which one would you like me to go over?

Let f be a function with domain I .

Which one (or ones) of the following is (or are) a definition of “ f has a maximum on I ”?

1. $\forall x \in I, \exists C \in \mathbb{R}$ s.t. $f(x) \leq C$
2. $\exists C \in I$ s.t. $\forall x \in I, f(x) \leq C$
3. $\exists C \in \mathbb{R}$ s.t. $\forall x \in I, f(x) \leq C$
4. $\exists C \in \mathbb{R}$ s.t. $\forall x \in I, f(x) < C$
5. $\exists a \in I$ s.t. $\forall x \in I, f(x) \leq f(a)$
6. $\exists a \in I$ s.t. $\forall x \in I, f(x) < f(a)$

Can this be proven? (Use IVT)

1. Prove that between 1:00 and 1:30, the hour and minute hand cross each other.

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1. Prove that between 1:00 and 1:30, the hour and minute hand cross each other.
2. During a Raptors basketball game, at half time the Raptors have 52 points. Prove that at some point they had exactly 26 points.
3. Prove that at some point during Alfonso's life, his height in centimetres was exactly equal to 10 times his weight in kilograms. Some data:
 - His height at birth: 47 cm
 - His weight at birth: 3.2 kg
 - His height today: 172 cm
 - His weight today: at least 20 kg

Prove that the 2 has a square root in the rational numbers.