

Math 1A: Discussion 9/10/2018 Problems

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September 10, 2018

Strategies for computing limits:

- Plug it in.
- Look for the $0/0$ and look for opportunities to cancel, simplify, or rationalize the numerator.
- Asymptotic analysis - in particular for limits that are infinite.

Problem Set 1

Question 1

Consider the function

$$f(t) = t - 1 \text{ if } t \leq 0$$

$$f(t) = t^2 \text{ if } 0 < t < 1$$

$$f(t) = t \text{ if } t \geq 1$$

- Sketch the graph of f .
- Compute the following limits if they exist

$$\lim_{t \rightarrow 0} f(t)$$

$$\lim_{t \rightarrow 1} f(t)$$

Question 2

Compute the following limits.

$$\lim_{x \rightarrow 0} (x^2 - 3x + \sqrt{x+1})$$

$$\lim_{x \rightarrow 2} \frac{x^2 - 3x + 2}{x - 2}$$

$$\lim_{x \rightarrow 2^-} \frac{x}{x - 2}$$

$$\lim_{x \rightarrow 2^+} \frac{x}{x - 2}$$

Problem Set 2

Question 3

Compute the following limits:

$$\lim_{h \rightarrow 0} \frac{\frac{1}{2+h} - \frac{1}{2}}{h}$$

$$\lim_{x \rightarrow \frac{\pi}{2}^-} \frac{\tan(x)}{x}$$

$$\lim_{x \rightarrow 0^+} \frac{1}{1 - e^x}$$

$$\lim_{h \rightarrow 0} \frac{\sqrt{1+h} - 1}{h}$$

(Hint: Multiply this by $\frac{\sqrt{1+h}+1}{\sqrt{1+h}+1}$ to rationalize the numerator.)

$$\lim_{x \rightarrow 1} \frac{1 - \sqrt{x}}{1 - x}$$

(Hint: Difference of squares.)

Problem Set 3

Question 4 (*)

Find a formula for the following limit, where x is any real number.

$$\lim_{h \rightarrow 0} \frac{\sqrt[3]{x+h} - \sqrt[3]{x}}{h}$$