

## Exam 1 FRQ Musts

- 1) Write Squeeze Theorem/ IVT
- 2) Write  $\lim_{x \rightarrow \dots}$  at every necessary step
  - stop after the limit is evaluated
- 3) If using IVT, explain why the function is continuous

$$\lim_{x \rightarrow 0} x^2 \sin\left(\frac{1}{x}\right)$$

$$-1 \leq \sin(x) \leq 1$$

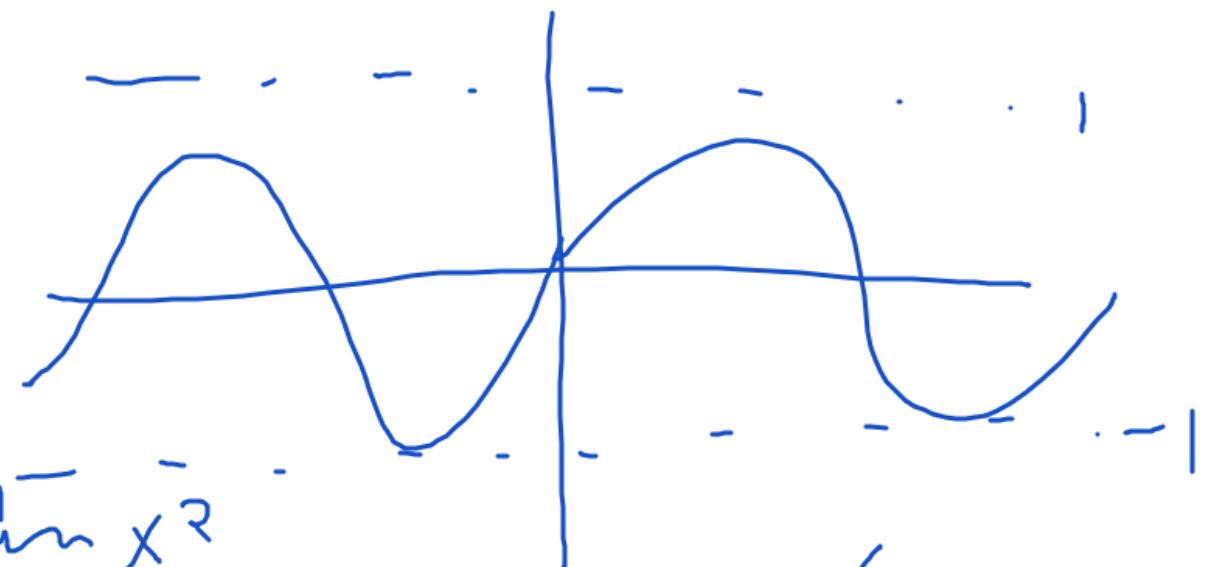
$$-1 \leq \sin\left(\frac{1}{x}\right) \leq 1$$

$$-x^2 \leq x^2 \sin\left(\frac{1}{x}\right) \leq x^2$$

$$\lim_{x \rightarrow 0} -x^2 \leq \lim_{x \rightarrow 0} x^2 \sin\left(\frac{1}{x}\right) \leq \lim_{x \rightarrow 0} x^2$$

$$0 \leq g(x) \leq 0$$

By the Squeeze Thm ✓



$$\lim_{x \rightarrow \infty} \frac{2 - \cos(x)}{x+3}$$

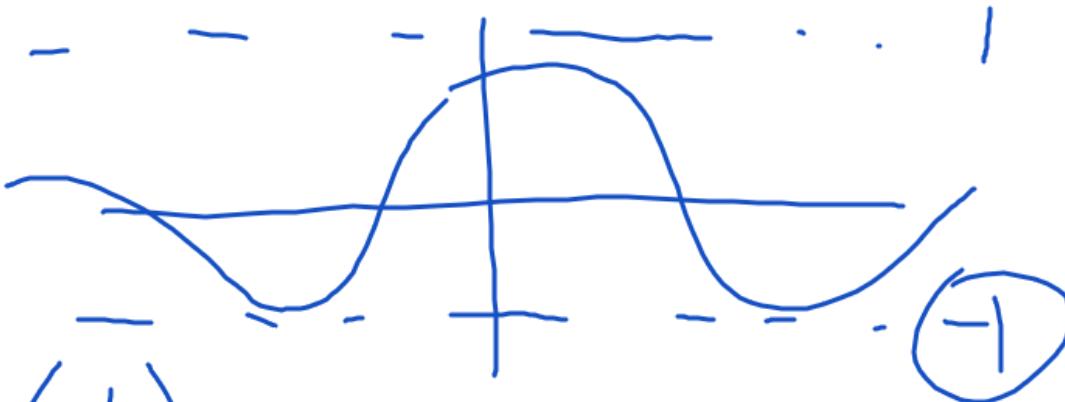
$$\rightarrow (-1) \leq \cos(x) \leq 1) \quad (-1)$$

$$(1 \geq -\cos(x) \geq -1) + 2$$

$$\frac{3}{x+3} \geq \frac{2 - \cos(x)}{x+3} \geq \frac{1}{x+3}$$

$$\lim_{x \rightarrow \infty} \frac{3}{x+3} \geq \lim_{x \rightarrow \infty} \frac{2 - \cos(x)}{x+3} \geq \lim_{x \rightarrow \infty} \frac{1}{x+3} = 0$$

by the Sq.TL.



$$\lim_{x \rightarrow \infty} \frac{1}{x+3}$$

1000000

$$\frac{1}{1000000}$$

↑

$$\lim_{x \rightarrow -2} \frac{-6|x| + 12}{3x+6}$$

$$\left( \begin{array}{l} \lim_{x \rightarrow -2} \frac{-6(x) + 12}{3x+6} \\ \lim_{x \rightarrow -2} \underline{\underline{-6x}} \end{array} \right)$$

$0 < x \leftarrow$

$$\left. \frac{6x + 12}{3x+6} \right\} = 2 \quad x < 0$$
$$\lim_{x \rightarrow -2} 2 = 2$$

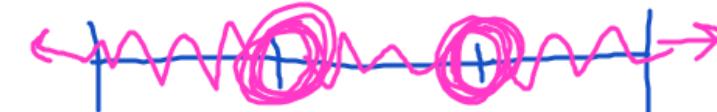
$$g(x) = x^2 + \frac{e^x}{x^2 - 1}$$

find int. where  
 $g(x)$  is cont.

$$x^2 \rightarrow (-\infty, \infty)$$

$$e^x \rightarrow (-\infty, \infty)$$

$$\frac{1}{x^2 - 1} \rightarrow x \neq 1$$
$$x \neq -1$$



A number line with points labeled -1 and 1. The regions between these points are circled in pink. The intervals are enclosed in a blue box:

$$(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$$

$$g(x) = \underbrace{m(x)}_{(0, \infty)} + \frac{1}{x-2} \quad x \neq 2 \rightarrow (0, 2) \cup (2, \infty)$$

$$f(x) = \frac{x^2 - 3x - 5}{3x} \quad \text{has a zero on } [-2, -1]$$

continuous

$$\left. \begin{array}{l} f(-2) = -\frac{5}{6} \\ f(-1) = \frac{1}{3} \end{array} \right\} -\frac{5}{6} \leq 0 \leq \frac{1}{3}$$