Exam 1 FRQ Musts

1) Write Squeeze Theorem, IVT

2) Write $\lim_{x \to \dots}$ every step necessary
   - after you take the limit, stop writing $\lim_{x \to \dots}$

3) For IVT, make sure to say why the function is continuous

$$\lim_{x \to -3} (x+3)\cos\left(-\frac{20}{x+3}\right) = 0$$

$$-1 \le \cos(x) \le 1$$

$$0 \le g(x) \le 0$$

By the Sq. Th.

$$* \quad -1 \le \cos\left(\frac{-20}{x+3}\right) \le 1$$

$$-(x+3) \le (x+3)\cos\left(\frac{-20}{x+3}\right) \le x+3$$

$$* \lim_{x \to -3} -(x+3) \le \underbrace{\lim_{x \to -3} (x+3)\cos\left(\frac{-20}{x+3}\right)}_{g(x)} \le \lim_{x \to -3} x+3$$

$$\lim_{x\to\infty} \frac{2-\cos x}{x+3}$$

$$-1 \le \cos x \le 1$$

$$1 \ge -\cos x \ge -1$$

$$\frac{3}{x+3} \ge \frac{2-\cos x}{x+3} \ge \frac{1}{x+3}$$

$$\lim_{x\to\infty} \frac{3}{x+3} \ge \lim_{x\to\infty} \frac{2-\cos x}{x+3} \ge \lim_{x\to\infty} \frac{1}{x+3}$$

$$0 \qquad\qquad = 0 \text{ by Sq. Th.} \qquad\qquad 0$$

$$\lim_{x\to\infty} \frac{3}{x+3} = \frac{3}{1000003} \cdots \frac{3}{\infty} \to 0$$

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

$$\to 1000000$$
$$10000000$$
$$100000000\ldots$$

$$\lim_{x \to 4} f(x) = 3, \quad \lim_{x \to 0} g(x) = -5$$

$$\lim_{x \to 0} f(x+4) + g(x)$$

$$\lim_{x \to 0} f(x+4) + \lim_{x \to 0} g(x)$$

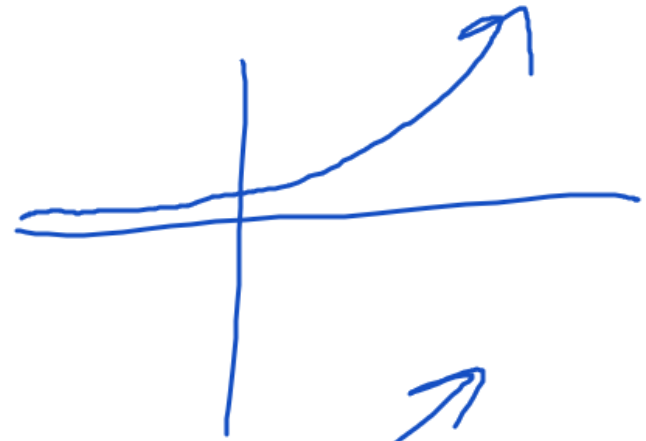
$$-5$$

$$u \to u = x - 4 \to x = u + 4$$

$$\lim_{u \to 0} f(u+4) = 3 \to \lim_{x \to 0} f(x+4) = 3$$

$$3 - 5 = -2$$

$$f(x) = \begin{cases} e^{kx} & 0 \le x \le 3 \\ x+3 & x > 3 \end{cases}$$



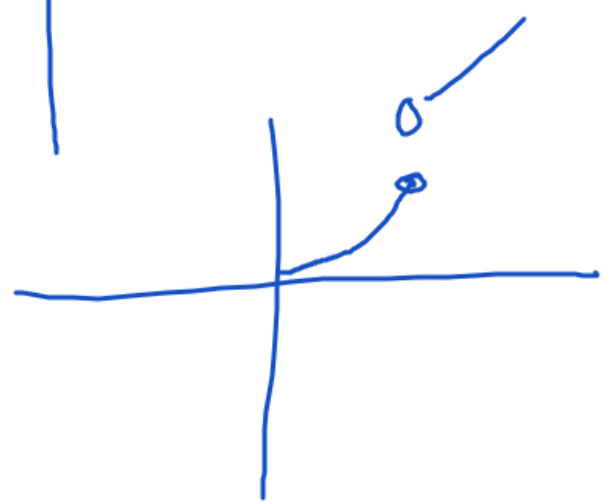
$$e^{3k} = 6$$

$$\ln(e^{3k}) = \ln(6)$$

$$3k = \ln(6)$$

$$k = \frac{\ln(6)}{3}$$

$k \approx 0.597$



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

$$f(x) = \begin{cases} \dfrac{-6x+12}{3x+6} & 0 \le x < \infty \\ \dfrac{6x+12}{3x+6} & -\infty < x \le 0 \end{cases}$$

$$= \boxed{2}$$