

score	possible	problem
	20	1
	20	2
	20	3
	20	4
	20	5
	100	

Name: _____

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Work in groups of 3 or 4. Show your work. Acknowledge any help on these specific problems.

- /20 1. Use the Squeeze Theorem to evaluate the limit. Indicate which functions you are using to squeeze.

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

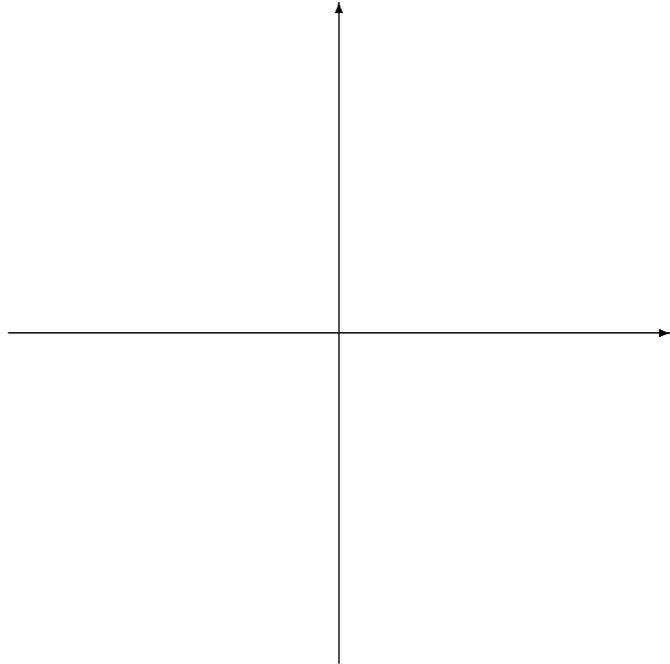
- /20 2. Use the Intermediate Value Theorem to show that the equation $3^x = x^2$ has a solution.

/20 3. Consider the function

$$f(x) = \begin{cases} x^2 - 1 & \text{if } x \leq -2 \\ x + A & \text{if } x > -2 \end{cases},$$

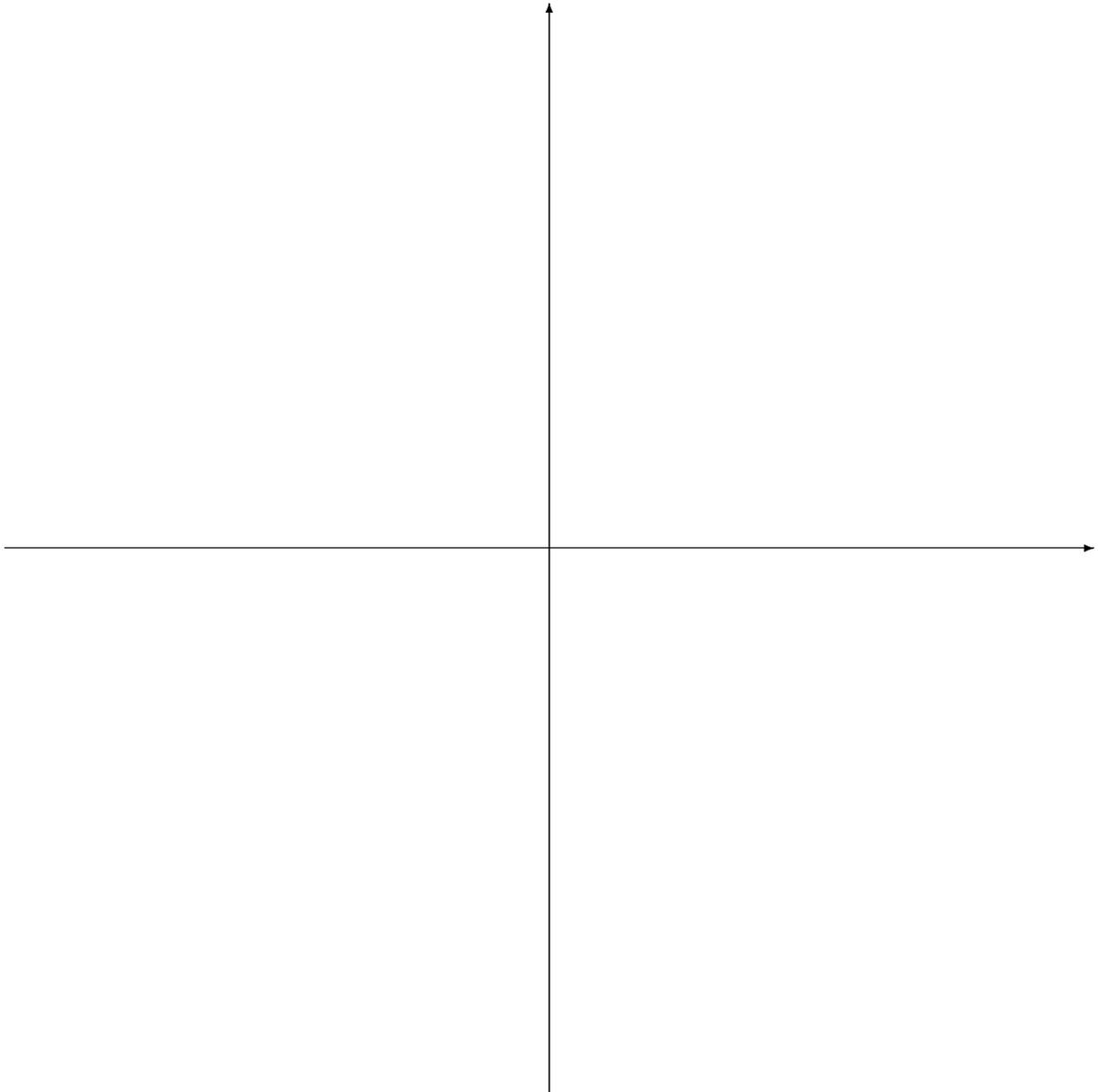
where A is some constant.

- Find $\lim_{x \rightarrow -2^-} f(x)$. Is f continuous from the left at $x = -2$?
- What value of A would make f continuous at $x = -2$?
- Using the value of A that you just found, graph f .



/20 4. Sketch the graph of a single function f that:

- has domain $[-4, 5]$
- has $f(2) = 1$
- has $\lim_{x \rightarrow 2} f(x) = 4$
- has $\lim_{x \rightarrow 3^+} f(x) = -3$
- has $\lim_{x \rightarrow 3^-} f(x) = 3$
- is continuous except possibly at $x = 1$, $x = 2$, and $x = 3$



/20 5. Sketch the graph of a single function f that:

- has $\lim_{x \rightarrow 2} f(x) = \infty$
- has $\lim_{x \rightarrow -2^+} f(x) = \infty$
- has $\lim_{x \rightarrow -2^-} f(x) = -\infty$
- has $\lim_{x \rightarrow \infty} f(x) = \infty$
- has $\lim_{x \rightarrow -\infty} f(x) = 3$
- is continuous except possibly at $x = 2$ and $x = -2$

