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. Aknowledge any help on these specific problems.

/20 1. Consider the function

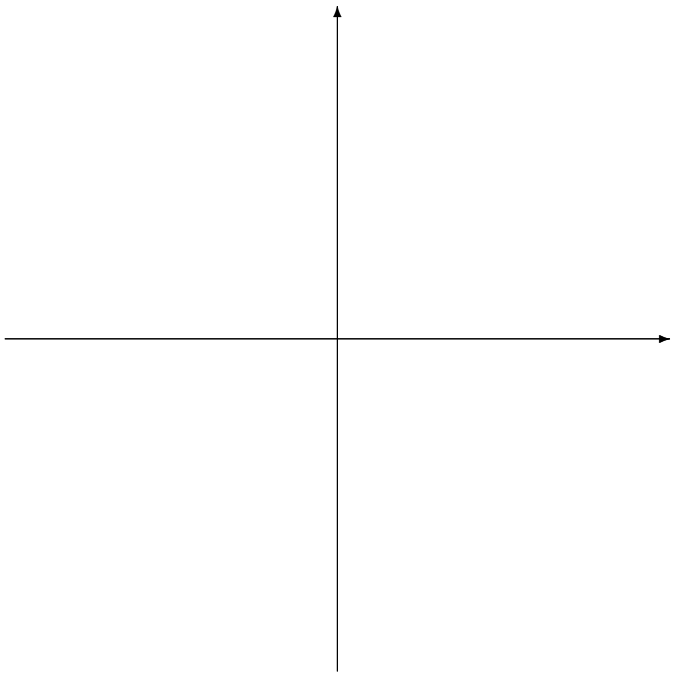
$$f(x) = \begin{cases} x^2 - 1 & \text{if } x \leq -2 \\ x + A & \text{if } x > -2 \end{cases},$$

where A is some constant.

(a) Find $\lim_{x \to -2^-} f(x)$. Is f continuous from the left at $x = -2$?

(b) What value of A would make f continuous at $x = -2$?

(c) Using the value of A that you just found, graph f.

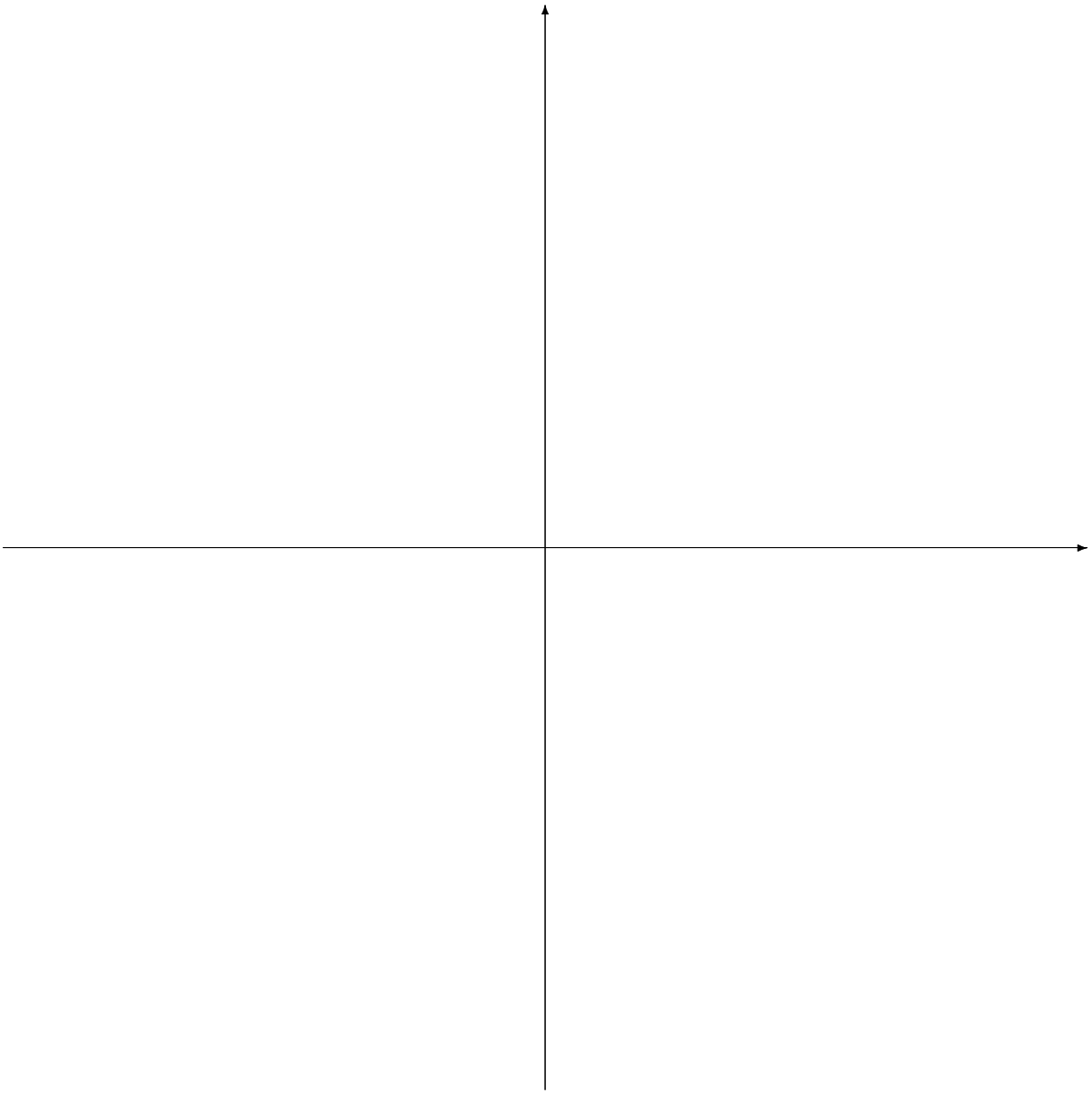


/20 2. State the Squeeze Theorem. Identify what are its assumptions (hypotheses) and what are its conclusions. Use the Squeeze Theorem to evaluate $\lim_{x\to 0} \sin(x)\cos\left(\frac{1}{x^2}\right)$. Indicate which functions you are using to squeeze.

/20 3. State the Intermediate Value Theorem. Identify what are its assumptions (hypotheses) and what are its conclusions. Use the Intermediate Value Theorem to show that the equation $3^x = x^2$ has a solution.

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

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



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

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