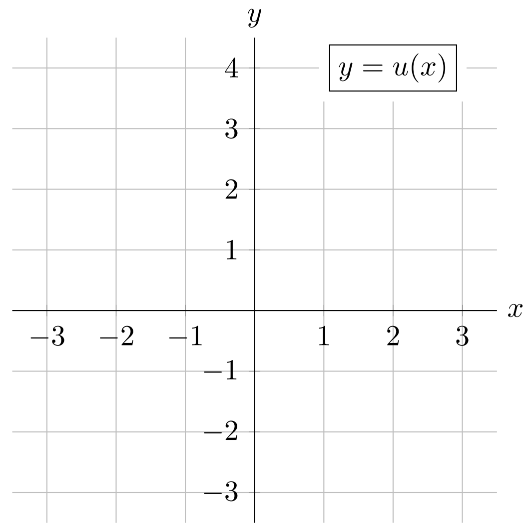
7. [8 points] For each part below, carefully draw the graph of a single function on the given axes that satisfies the given conditions.

a. [4 points]
A function $u(x)$, defined for all $-3 \leq x \leq 3$, that satisfies all of the following:

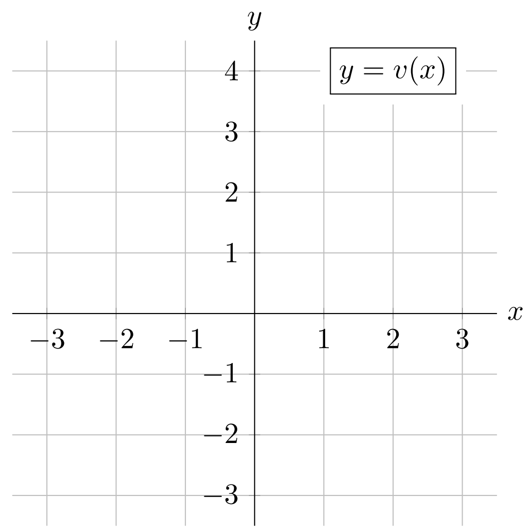
- $u(x)$ is invertible;
- $u(x)$ is decreasing and concave up on $(-3, 0)$;
- $u(x)$ is increasing and concave down on $(0, 3)$;
- $u(x)$ is *not* continuous at $x = 0$, but *is* continuous on the intervals $(-3, 0)$ and $(0, 3)$.



b. [4 points]

A function $v(x)$, defined for all $-3 \leq x \leq 3$, that satisfies all of the following:

- $v(x)$ is an even function;
- $v'(2) = -1$
- $\lim_{x \to 3^-} v(x)$ exists but does not equal $v(3)$.
- $\lim_{h \to 0^+} \dfrac{v(0+h) - v(0)}{h} = 1$



8. [4 points] Recall from Team HW 2 that if the function $f(x)$ is not defined at a, we say that $f(x)$ can be *continuously extended* to a if there is a number c such that the piecewise defined function

$$F(x) = \begin{cases} f(x) & x \neq a \\ c & x = a \end{cases}$$

is continuous at a. Write down a formula for a rational function $r(x)$ that satisfies all of the following conditions, or, if no such rational function exists, write DNE:

- the domain of $r(x)$ is all real numbers except for 0 and 3;
- $r(x)$ can be continuously extended to 0;
- $r(x)$ *cannot* be continuously extended to 3.

Answer: $r(x) =$ ________________________