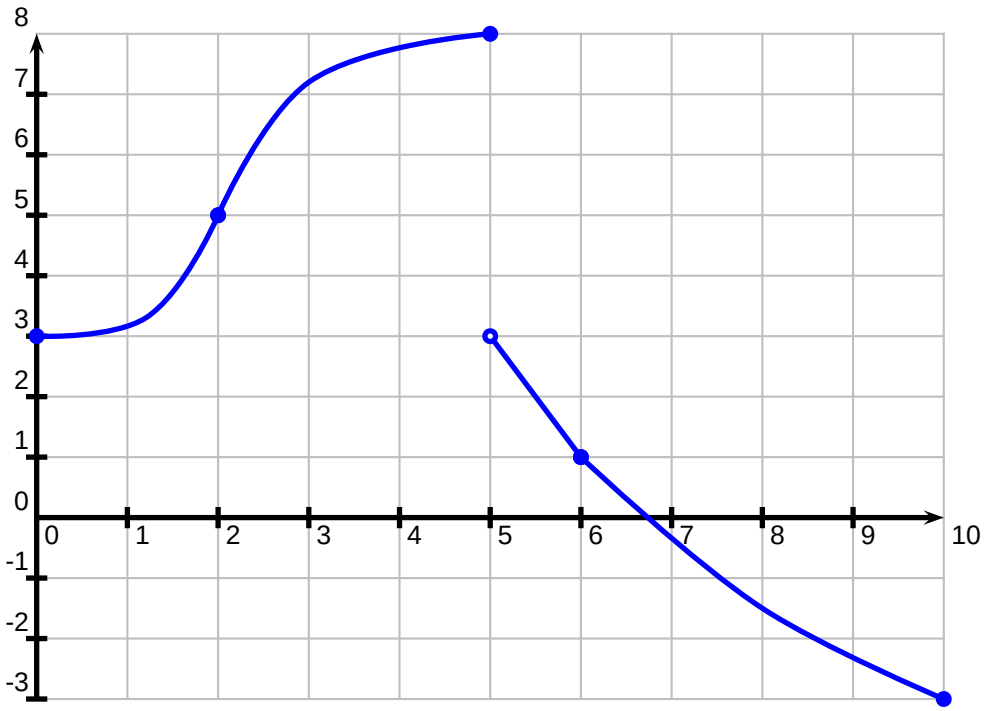
2. [8 points] On the axes provided below, sketch the graph of a function f, defined on the interval $[0, 10]$, which satisfies **ALL** of the following properties. (Hint: the function f is not required to be continuous.)

- f is invertible on the entire domain $[0, 10]$.
- $f(0) = 3$
- $f^{-1}(5) = 2$
- $f'(x) > 0$ for $0 < x < 5$.
- $f''(x) > 0$ for $0 < x < 2$.
- $f'(x)$ is decreasing on the interval $(2, 5)$.
- $f'(x) = -2$ for $5 < x < 6$.
- $\lim_{x \to 10^-} f(x) = -3$.



3. [6 points] Consider the function $f(x) = 13x \sin(x^2 + 1)$. Write down the limit definition of $f'(2)$. (You do not need to estimate or compute the derivative.)

Solution:

$$f'(2) = \lim_{h \to 0} \frac{13(2+h)\sin((2+h)^2+1) - 26\sin(5)}{h}$$

OR

$$f'(2) = \lim_{h \to 0} \frac{13(2+h)\sin((2+h)^2+1) - 13(2)\sin(2^2+1)}{h}$$