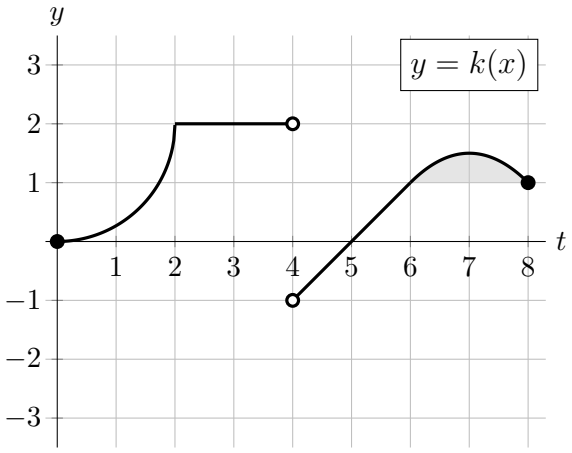
**3**. [13 points]
A portion of the graph of the function $k(x)$ is shown to the right. Note the following facts about $k(x)$:

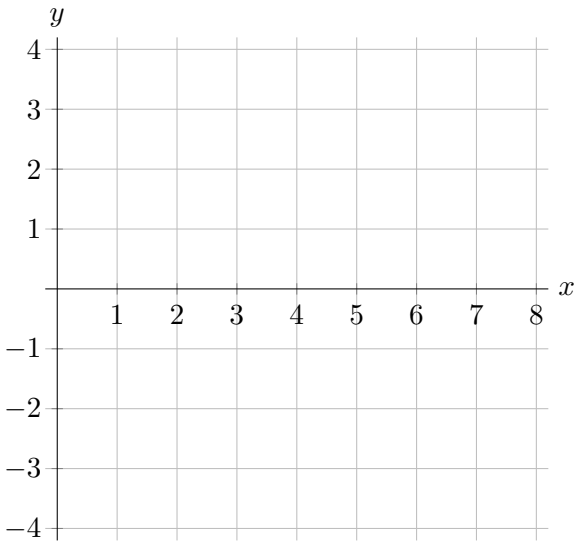
- On the interval $0 \le x \le 2$, the graph of $k(x)$ is a quarter circle.
- On the interval $2 \le x < 4$ and $4 < x \le 6$, $k(x)$ is linear.
- On the interval $6 < x \le 8$, $k(x)$ is quadratic, given by $k(x) = -\frac{1}{2}x^2 + 7x - 23$.
- The shaded region has area $2/3$.




**a**. [6 points]

On the axes to the right, sketch a detailed graph of $k'(x)$, the derivative of $k(x)$, for $0 < x < 8$. Make sure the following are clear from your graph:

- where $k'(x)$ is undefined;
- any vertical asymptotes of $k'(x)$;
- where $k'(x)$ is zero, positive, or negative;
- where $k'(x)$ is increasing, decreasing, or constant;
- where $k'(x)$ is linear (with correct slope).




**b**. [7 points]

Let $K(x)$ be a continuous antiderivative of $k(x)$ satisfying $K(2) = -3$. On the axes to the right, sketch a detailed graph of $K(x)$ for $0 \le x \le 8$. Make sure the following are clear from your graph:

- where $K(x)$ is and is not differentiable;
- the approximate values of $K(x)$ at $x = 0$, 2, 3, 4, 6, 7, and 8;
- where $K(x)$ is increasing, decreasing, or constant;
- the concavity and any inflection points of $K(x)$.