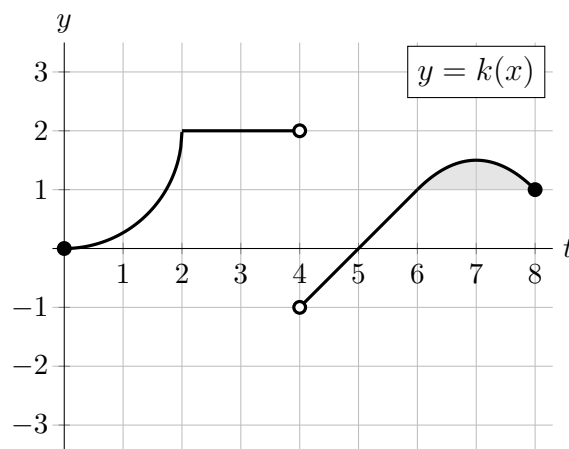


3. [13 points]

A portion of the graph of the function  $k(x)$  is shown to the right. Note the following facts about  $k(x)$ :

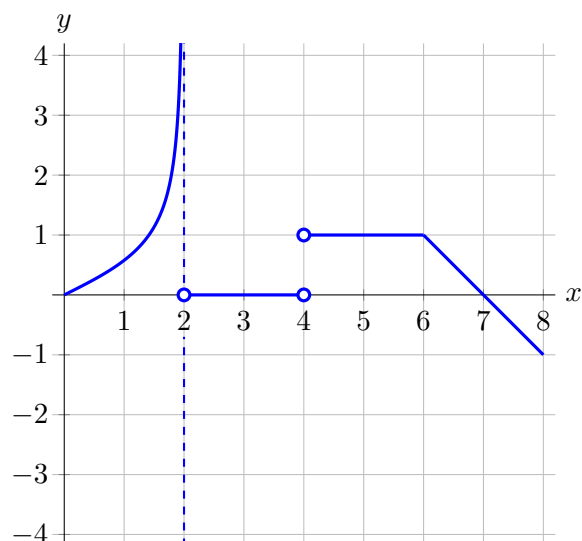
- On the interval  $0 \leq x \leq 2$ , the graph of  $k(x)$  is a quarter circle.
- On the interval  $2 \leq x < 4$  and  $4 < x \leq 6$ ,  $k(x)$  is linear.
- On the interval  $6 < x \leq 8$ ,  $k(x)$  is quadratic, given by  $k(x) = -\frac{1}{2}x^2 + 7x - 23$ .
- The shaded region has area  $2/3$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



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  $0 \leq x \leq 8$ . 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  $K(x)$ .

