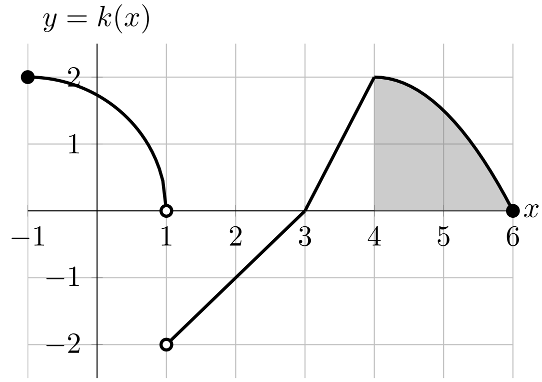
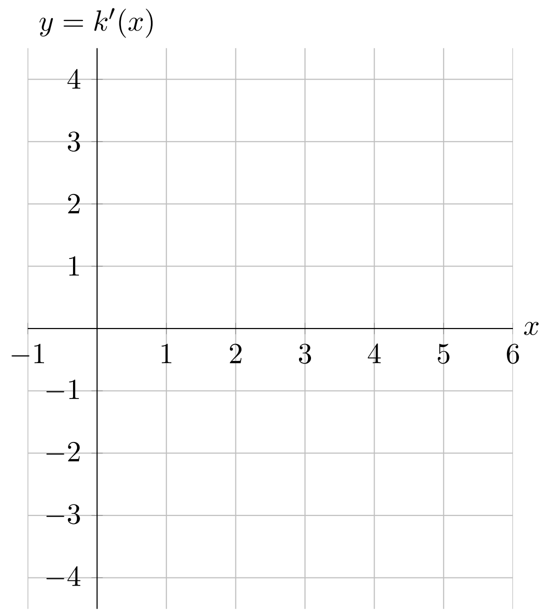
1. [13 points]

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



- $k(x)$ consists of a quarter circle on $-1 \le x < 1$
- $k(x)$ is piecewise linear on $1 < x \le 4$
- $k(x) = -\frac{1}{2}(x-4)^2 + 2$ on the interval $4 \le x \le 6$
- the area of the shaded region is $\frac{8}{3}$

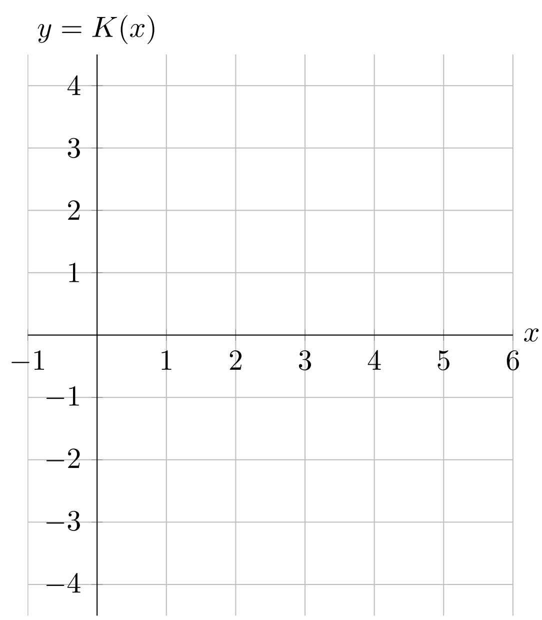
a. [6 points]



On the axes to the right, carefully sketch the graph of $k'(x)$, the derivative of $k(x)$, on the interval $-1 < x < 6$. Be sure that your graph carefully indicates:

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

b. [7 points]



Let $K(x)$ be a continuous antiderivative of $k(x)$ with $K(1) = 0$. On the axes to the right, carefully draw a graph of $K(x)$ on $-1 \le x \le 6$. Be sure that your graph carefully indicates:

- where $K(x)$ is and is not differentiable
- the values of $K(x)$ at $x = -1, 1, 3, 4,$ and 6
- where $K(x)$ is increasing, decreasing, and constant
- the concavity of $K(x)$ and any inflection points of $K(x)$