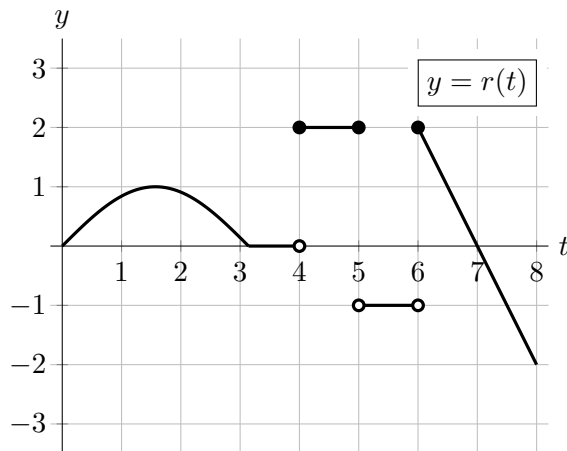


4. [14 points]

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

- on the interval $0 < t < \pi$, we have $r(t) = \sin t$;
- $r(t) = 0$ for all $\pi \leq t < 4$; and
- $r(t)$ is piecewise linear on the interval $\pi < t < 8$.

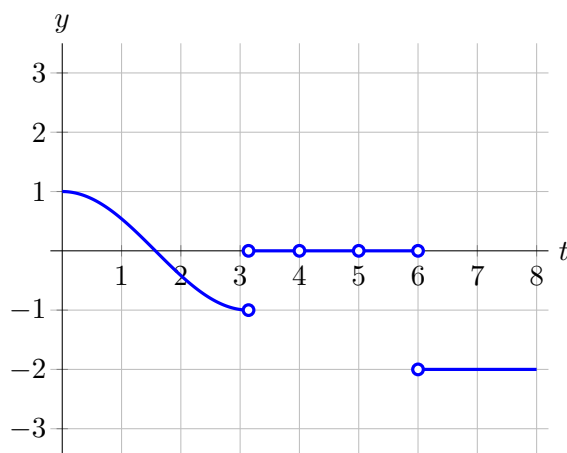


a. [6 points]

On the axes to the right, sketch a detailed graph of $r'(t)$, the derivative of $r(t)$, for $0 < t < 8$.

Make sure the following are clear from your graph:

- where $r'(t)$ is undefined;
- any vertical asymptotes of $r'(t)$;
- where $r'(t)$ is zero, positive, or negative;
- where $r'(t)$ is increasing, decreasing, constant, concave up, or concave down.



b. [8 points]

Let $R(t)$ be a continuous antiderivative of $r(t)$ on the interval $(0, 8)$ satisfying $R(\pi) = 0$. On the axes to the right, sketch a detailed graph of $R(t)$ for $0 < t < 8$. Make sure that the following are clear from your graph:

- where $R(t)$ is and is not differentiable;
- the values of $R(t)$ at $t = 4, 5, 6, 7,$ and 8 , along with the limit $\lim_{t \rightarrow 0^+} R(t)$;
- where $R(t)$ is increasing, decreasing, or constant;
- the concavity and any inflection points of $R(t)$.

