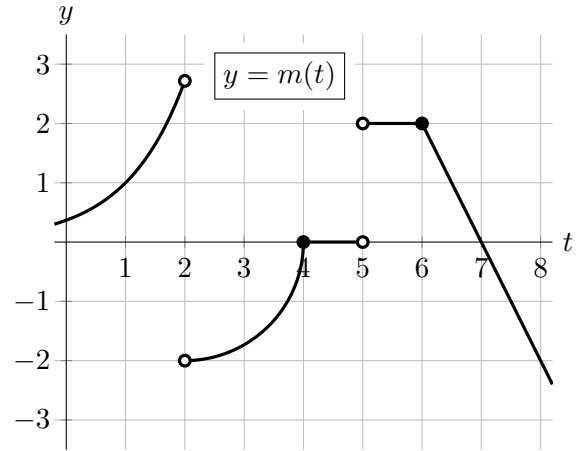


2. [12 points]

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

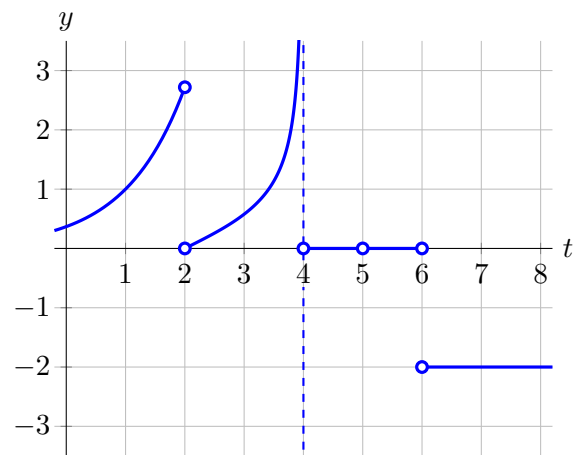
- on the interval  $t < 2$ , we have  $m(t) = e^{t-1}$ ;
- on the interval  $2 < t < 4$ , the graph of  $m(t)$  is a quarter of a circle;
- $m(t)$  is piecewise linear on the interval  $4 < t < 6$ ;
- $m(t)$  is linear on the interval  $t > 6$ .



a. [5 points]

On the axes to the right, sketch a detailed graph of  $m'(t)$ , the derivative of  $m(t)$ , for  $0 \leq t \leq 8$ . Make sure the following are clear from your graph:

- where  $m'(t)$  is undefined;
- any vertical asymptotes of  $m'(t)$ ;
- where  $m'(t)$  is zero, positive, or negative;
- where  $m'(t)$  is increasing, decreasing, or constant;
- where  $m'(t)$  is linear (with correct slope).



b. [7 points]

Let  $M(t)$  be a continuous antiderivative of  $m(t)$  satisfying  $M(2) = 2$ . On the axes to the right, sketch a detailed graph of  $M(t)$  for  $0 \leq t \leq 8$ . Note that  $\pi \approx 3.14$ ,  $e \approx 2.72$  and  $e^{-1} \approx 0.37$ . Make sure the following are clear from your graph:

- where  $M(t)$  is and is not differentiable;
- the approximate values of  $M(t)$  at  $t = 0, 3, 4, 5, 6, 7,$  and  $8$ ;
- where  $M(t)$  is increasing, decreasing, and constant;
- the concavity and any inflection points of  $M(t)$ .

