

**Exercise 42**

Each limit represents the derivative of some function  $f$  at some number  $a$ . State such an  $f$  and  $a$  in each case.

$$\lim_{\theta \rightarrow \pi/6} \frac{\sin \theta - \frac{1}{2}}{\theta - \pi/6}$$

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**Solution**

Recall that the derivative of  $f(\theta)$  is defined by

$$f'(\theta) = \lim_{\theta \rightarrow a} \frac{f(\theta) - f(a)}{\theta - a}.$$

Comparing this to the given limit,

$$f(\theta) = \sin \theta,$$

and its derivative is being evaluated at  $a = \pi/6$ .