Exercise 27

Evaluate the limit, if it exists.

$$\lim_{x\to 16} \frac{4-\sqrt{x}}{16x-x^2}$$

Solution

Rewrite the function, cancel the common factors, and then evaluate the limit.

$$\begin{aligned}\lim_{x\to 16} \frac{4-\sqrt{x}}{16x-x^2} = \lim_{x\to 16} \frac{4-\sqrt{x}}{16x-x^2}\cdot\frac{4+\sqrt{x}}{4+\sqrt{x}} = \lim_{x\to 16} \frac{16-x}{(16x-x^2)(4+\sqrt{x})} &= \lim_{x\to 16} \frac{16-x}{x(16-x)(4+\sqrt{x})} \\ &= \lim_{x\to 16} \frac{1}{x(4+\sqrt{x})} \\ &= \frac{1}{16(4+\sqrt{16})} \\ &= \frac{1}{128}\end{aligned}$$