

23-42. Locating critical points Find the **critical points** of the following functions. Assume a is a nonzero constant.

$f'(x) = 0$ or DNE

$$f(x) = \frac{x}{\sqrt{x-a}}$$

$f(x)$ is undefined at $x=a$

$$f(x) = \frac{x}{\sqrt{x-a}} \Rightarrow f'(x) = \frac{1 \cdot \sqrt{x-a} - x \cdot (\sqrt{x-a})'}{(x-a)}$$

$$f'(x) = \frac{\sqrt{x-a} - x \cdot \frac{1}{2} (x-a)^{-1/2} \cdot 1}{(x-a)}$$

$$f'(x) = \frac{\frac{\sqrt{x-a}}{2\sqrt{x-a}} - \frac{x}{2\sqrt{x-a}}}{(x-a)} = \frac{2(x-a) - x}{2\sqrt{x-a} \cdot (x-a)}$$

$$= \frac{2x - 2a - x}{2\sqrt{x-a} \cdot (x-a)^{1/2}} = \frac{x - 2a}{2(x-a)^{3/2}} \rightarrow \text{DNE}$$

$x = ?$

$x - 2a = 0$
 $x = 2a$ (critical p.)

$f'(x) = 0$

$2(x-a)^{3/2} = 0$

$x = a$ NOT in the domain

$f'(x)$ DNE