PROCEDURE **Locating Absolute Maximum and Minimum Values**

Assume the function f is continuous on the closed interval $[a, b]$.

1. Locate the critical points c in (a, b), where $f'(c) = 0$ or $f'(c)$ does not exist. These points are candidates for absolute maxima and minima.
2. Evaluate f at the critical points and at the endpoints of $[a, b]$.
3. Choose the largest and smallest values of f from Step 2 for the absolute maximum and minimum values, respectively.

Section 22 – Absolute Extrema

Example 3(g)

Find the locations of all absolute extrema for $h(x) = \sqrt{x^2 - 9}$.

Solution

The domain of h is $(-\infty, -3] \cup [3, \infty)$.

The candidates test needs to be modified slightly.

$$h(x) = \sqrt{x^2 - 9} \quad \Longrightarrow \quad h'(x) = \frac{x}{\sqrt{x^2 - 9}}$$

The critical numbers are ± 3. 0 is not in the domain of h.

Evaluate h at each end point and at each critical point.

$h(3) = 0$ and $h(-3) = 0$.

This means that 0 is the global minimum for h and it occurs at both $x = \pm 3$.

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