$f(x) = (x-2)\sqrt{5-x}$

1. $DB = \{x;\, x \in \mathbb{R};\ x \leq 5\}$

   $P_y\,(0 \mid -2\sqrt{5})$

   Symmetrie: keine

2. Nullstellen: $f(x) = \underbrace{(x-2)}\,\underbrace{\sqrt{5-x}} = 0$

   $x_{01} = 2 \quad x_{02} = 5$

3. Unstetigkeiten: ~~f(x)~~ $\rightsquigarrow$ keine Unstetigkeiten

4. Lokale Extrema:

$$f(x) = \underbrace{(x-2)}_{u}\,\underbrace{\sqrt{5-x}}_{v}$$

$$f'(x) = u'v + uv'$$

$$f'(x) = 1 \cdot \sqrt{5-x} + \left(\overbrace{\tfrac{1}{2}(5-x)^{-\frac{1}{2}}}^{v'} \cdot \underline{(x-2)}_{u} \cdot (-1)\right)$$

$$f'(x) = \sqrt{5-x} + \left(-\frac{0{,}5x+1}{(5-x)^{\frac{1}{2}}}\right)$$

$$f'(x) = \frac{5-x-0{,}5x+1}{(5-x)^{\frac{1}{2}}}$$

$$\underline{\underline{f'(x) = \frac{6-1{,}5x}{(5-x)^{\frac{1}{2}}}}}$$

not. Bed.: $f'(x) = 0 = \dfrac{6-1{,}5x}{(5-x)^{\frac{1}{2}}} \quad = -1{,}5x+6$

$$x_E = 4$$

hinr. Bed.: $f'(x) = \dfrac{-1{,}5x+6}{(5-x)^{\frac{1}{2}}}$

$$f''(x) = \frac{u'v - uv'}{v^2}$$

$$f''(x) = \frac{-1{,}5(5-x)^{\frac{1}{2}} - \left((-1{,}5x+6)\left(\frac{1}{2}(5-x)^{-\frac{1}{2}} \cdot (-1)\right)\right)}{(5-x)}$$

$$f''(x) = \frac{-1{,}5(5-x)^{\frac{1}{2}} - \left(\frac{(-1{,}5x+6)\cdot\left(-\frac{1}{2}\right)}{(5-x)^{\frac{1}{2}}}\right)}{(5-x)}$$

$$f''(x) = \frac{-1{,}5(5-x) - \left(\frac{3}{4}x - 3\right)}{(5-x)^{\frac{1}{2}}(5-x)}$$

$$f''(x) = \frac{-7{,}5 + \frac{6}{4}x - \frac{3}{4}x + 3}{(5-x)^{\frac{3}{2}}} \qquad f''(4) = -1{,}5 < 0 \rightarrow \text{Max}$$

$$\underline{\underline{f''(x) = \frac{\frac{3}{4}x - 4{,}5}{(5-x)^{\frac{3}{2}}}}} \qquad \underline{\underline{P_H\,(4 \mid 2)}}$$

5. Wendepunkte:

not. Bed.: $f''(x) = 0 = \dfrac{\frac{3}{4}x - 4{,}5}{(5-x)^{\frac{3}{2}}}$

$x_w = 6 \rightarrow x_w > DB \rightarrow$ keine Wendepunkte

6. $\lim\limits_{x \to +\infty} (x-2)\sqrt{5-x}$ = existiert nicht $(x \leq 5)$

$\lim\limits_{x \to -\infty} (x-2)\sqrt{5-x} = -\infty$

7. Graph: