p. 256 # 1

$$y = x\sqrt{2-x} \qquad -2 \le x \le 2$$

global extrema

$$y' = (2-x)^{1/2} - \frac{1}{2}x(2-x)^{-1/2}$$

$$= \sqrt{2-x} - \frac{1}{2}\frac{x}{\sqrt{2-x}}$$

$u = x$
$u' = 1$
$v = (2-x)^{1/2}$
$v' = -\frac{1}{2}(2-x)^{-1/2}$

$$0 = \sqrt{2-x} - \frac{1}{2}\cdot\frac{x}{\sqrt{2-x}}$$

$$\frac{1}{2}\frac{x}{\sqrt{2-x}} = \sqrt{2-x}$$

$$\frac{1}{2}x = 2-x$$

$$\frac{3}{2}x = 2 \qquad x = \frac{4}{3} \text{ c.p.}$$

End points: $x=-2$, $y = -4$

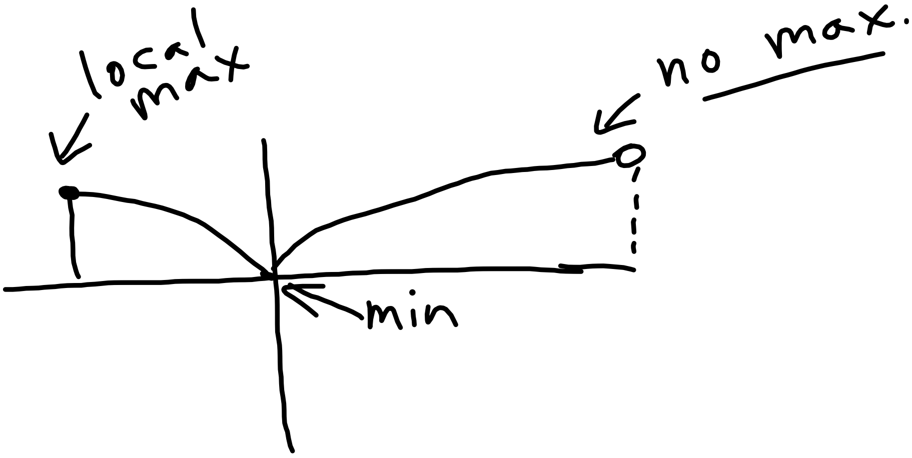
$x=2$, $y = 0$

Critical point: $x = \frac{4}{3}$, $y = \frac{4}{3}\sqrt{\frac{2}{3}}$

$$y = \frac{4}{3}\sqrt{\frac{6}{3}-\frac{4}{3}} = \frac{4}{3}\cdot\sqrt{\frac{2}{3}}$$

Global min: -4, occurs @ $x=-2$

Global max: $\frac{4}{3}\sqrt{\frac{2}{3}}$, occurs @ $x = \frac{4}{3}$



#5 $y = 1 + x - x^2 - x^4$

$y' = 1 - 2x - 4x^3$

$y'' = -2 - 12x^2$

y' (+) (−)

.385

(a) $(-\infty, .385]$ (increasing)

(b) $[.385, \infty)$ (decreasing)

y'' $(-)$

(c) nowhere (concave up)

(d) $(-\infty, \infty)$ (concave down)

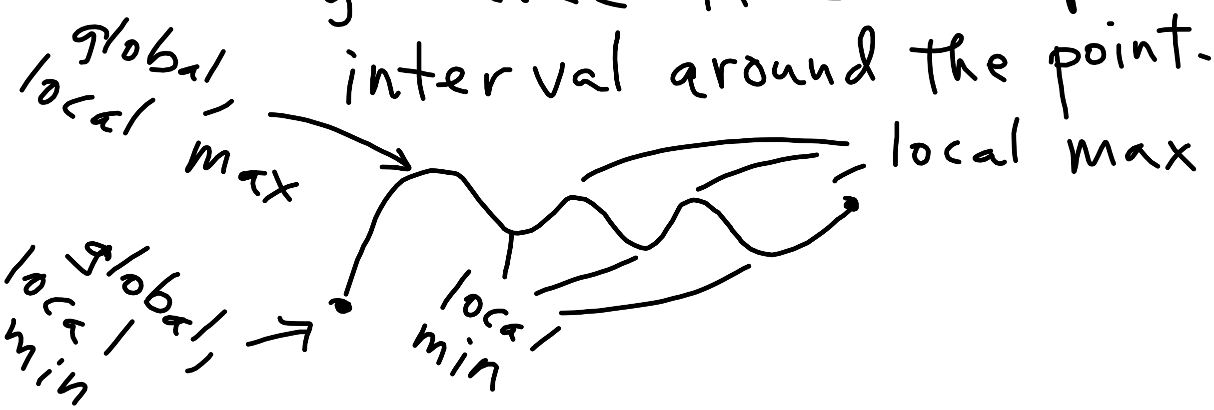
(e) $x = .385$ local max
b/c derivative changes sign from + to −

(f) none

Global vs. Local Extrema.

"Global" = "absolute" — the very biggest (smallest) y-value.

"Local" — biggest (smallest) y-value in some open interval around the point.



EVT guarantee:

- continuous

and
- closed interval

$\Rightarrow$ have both global min, global max