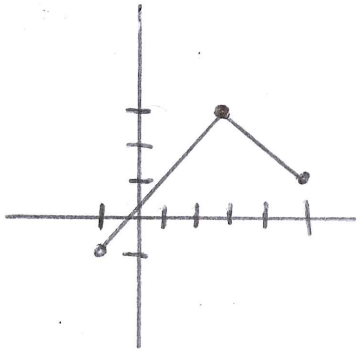
Ch. 3.1 Homework (Absolute Extrema and EVT)

p. 169-171 #1, 13, 15, 21, 23, 25, 27, 31, 37, 39, 41, 43
53, 55, 57, 63-65

Locate absolute extrema on closed interval

31) $y = 3 - |t-3|$, $[-1, 5]$ endpts: $(-1,-1)$, $(5,1)$

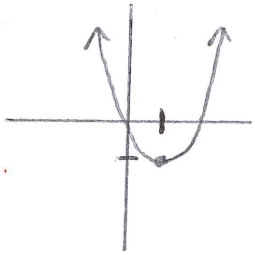


$y = -|t-3| + 3 \rightarrow$ vertex: $(3,3)$

$y(-1) = -1$
$y(5) = 1$
$y(3) = 3$

Abs. max is 3 at $x = 3$
Abs. min is -1 at $x = -1$

39) Locate absolute extrema over each interval: $y = x^2 - 2x$



$y'(x) = 2x - 2 \quad 0 = 2(x-1) \quad x = 1$ (critical point)

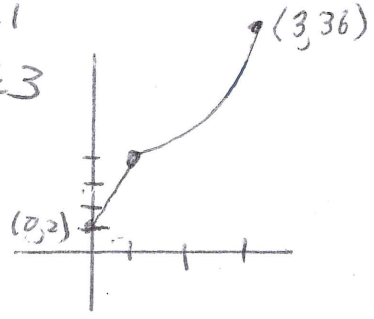
a) $[-1, 2]$ $f(-1) = 3 \rightarrow$ Abs max
$f(2) = 0$
$f(1) = -1 \rightarrow$ Abs min

b) $(1, 3]$ $f(3) = 3 \rightarrow$ Abs max

c) $(0, 2)$ $f(1) = -1 \rightarrow$ Abs min

d) $[1, 4)$ $f(1) = -1 \rightarrow$ Abs min

41) $f(x) = \begin{cases} 2x+2 & 0 \le x \le 1 \\ 4x^2 & 1 < x \le 3 \end{cases}$



Abs min is 2 at $x = 0$
Abs max is 36 at $x = 3$

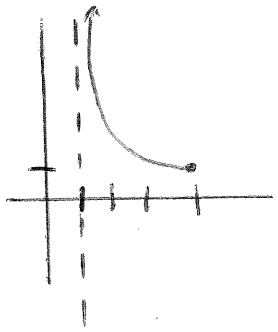
$y = 2x + 2$

x	y
0	2
1	4

$y = 4x^2$

x	y
1	4
2	16
3	36

43) $f(x) = \frac{3}{x-1}$ $(1, 4]$



Abs min is 1 at $x = 4$

No absolute max.