

## Max & Min Value Solutions

① abs max at  $x = 4$ , abs max value of 4

abs min at  $x = 2$ , abs min value of -1

local max at  $x = 4$  (value of 4)

local min at  $x = 2$  (value of -1)

② no absolute max

abs min at  $x = 0$  (value of 0)

no local max

local min at  $x = 0$  (value of 0)

③ no abs or local extrema

④ abs max at  $x = 1, 5$  (value of 1)

abs min at  $x = 3, 7$  (value of -1)

local max at  $x = 1, 5$  (value of 1)

local min at  $x = 3, 7$  (value of -1)

⑤ no abs or local extrema

⑥ abs max at  $x = 1$  (value of 1)

abs min at  $x = 0$  (value of 0)

no local extrema

⑦ no abs max  
abs min at  $x = 0, 2$  (value of 0)  
no local extrema

⑧ abs max at  $x = 5$  (value of 4)  
abs min at  $x = 1, 4$  (value of 3)  
local max at  $x = 2$  (value of 3)  
 $x = 5$  (value of 4)  
 $x \in (6, 7)$  (values of 2)  
local min at  $x = 4$  (value of 1)  
 $x \in [6, 7]$  (values of 2)

Note that if  $a$  is between 6 and 7,  
that is, if  $a \in (6, 7)$ , then  $f(a) \geq f(x)$   
for any  $x$  "near"  $a$ , and so  $a$  is a  
local max. It's also true that  $f(a) \leq f(x)$   
for any  $x$  "near"  $a$ , and so  $a$  is a  
local min as well.