

Taker Name:

GTID: 90

Section:

Grader #1:

GTID: 90

PA#4A- §14.7: Absolute max and min on a closed and bounded region

Find the absolute maxima and minima of the function

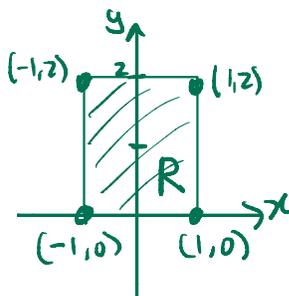
$$f(x, y) = y - x^2$$

on  $R = [-1, 1] \times [0, 2]$ , so  $R$  is the rectangle with vertices  $(-1, 0)$ ,  $(1, 0)$ ,  $(1, 2)$ , and  $(-1, 2)$ .

Step 1: Interior crit pts.Solve  $\nabla f = 0$ 

$$\text{So } \nabla f = \begin{pmatrix} -2x \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \quad \text{impossible}$$

NO interior crit pts.

Step 2: edge boundaries.

@  $x = -1$   $f(-1, y) = y - 1$  so  $\frac{df}{dy} = 1$  never zero  
(no crit pts on left edge)

@  $x = 1$   $f(1, y) = y - 1$  similar (or right edge)

@  $y = 0$   $f(x, 0) = 0 - x^2$  so  $\frac{df}{dx} = -2x = 0$

$\Rightarrow x = 0$  so crit point @  $(0, 0)$

@  $y = 2$   $f(x, 2) = 4 - x^2$  so  $\frac{df}{dx} = -2x = 0 \Rightarrow x = 0$  so crit @  $(0, 2)$ .

Step 3: evaluate @ crit pts and endpoints

$(x, y)$	$f(x, y)$
$(0, 0)$	0
$(0, 2)$	2
$(\pm 1, 0)$	-1
$(\pm 1, 2)$	1

MAX value of 2

MIN value of -1

A	
J	
N	
G2:	
A	
J	
N	
G3:	
A	
J	
N	