

# 4-7 exercises.

2.

$$a - b = 100$$

$$P = a \times b$$

$$a = 100 + b$$

$$P = a \times (a - 100)$$

$$b = a - 100$$

~~$$P = a^2 - 100a$$~~

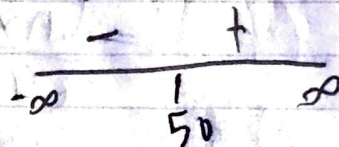
Using absolute  
values first derivative  
test,  $f'(x) < 0$  for

~~$$P' = 2a - 100$$~~

wait this is  
correct

~~$$P'(50) = 0$$~~

$$x < 50 \text{ and } f'(x) > 0$$



for  $x > 50$ .  $C$  is 50.

5.

$$V = |y| - yz$$

$$V = |(x+2) - x^2|$$

$$V' = \frac{(2x-1)(x^2-x-2)}{|x^2-x-2|}$$

$$|x^2 - x - 2|$$

$$V'(0) = 0$$

for  $C = .5$

$$V'(0) = \text{DNE}$$

the max  $\text{dist}$  for  $C = 2, -1$   
is 2.25.

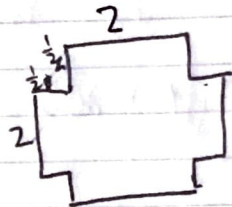
$$V(-1) = 0$$

$$V(.5) = 2.25$$

$$V(2) = 0$$

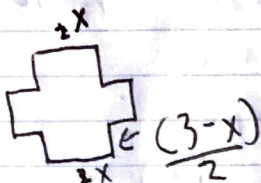
12. open top. square

cut 4 corners  
find best volume



$$2 \times 2 + \frac{1}{2}$$

No.



$$V = x^2 \cdot \frac{(3-x)}{2} \cdot \frac{1}{2}$$

$$V' = \frac{1}{2}(-x^2 + 2x(3-x)) \quad \text{domain is } (0, 3)$$

$$V'(x) = 0$$

$$\text{when } x = 0, 2$$

$$V(0) = 0$$

$$V(2) = 2$$

$$V(3) = 0$$

13.

$$xy = 1.5m$$

$$F = \text{Area}(x, y)$$

$$x = 1.5m$$

$$x \cdot \frac{1.5m}{x} = 1.5m$$

$$F = \text{min} \left( x, \frac{1.5m}{x} \right)$$

$$3x + \frac{3m}{x} = 1.5m$$

$$3 - \frac{3m}{x^2}$$

DNE at 0,

0 at  $x = 1000$

$x = 1000$

$y = 1500$

-1000



20

$$D = \sqrt{(x-3)^2 + y^2}$$

$$y = 5x$$

$$D = \sqrt{(x-3)^2 + x^2}$$

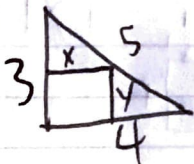
$$D'(x) = \frac{(2)(x-3) + 1}{\sqrt{(x-3)^2 + x^2}}$$

2.5

$$x = 2.5$$

$$y = \sqrt{2.5}$$

28.



$$x =$$

$$y = 3 - \frac{3x}{4}$$

$$y = 3 - \frac{3x}{4}$$

$$A = x \cdot \left(3 - \frac{3x}{4}\right)$$

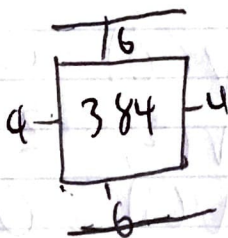
$$A' = 3 - \frac{3x}{4}$$

$$A' = 3 - \frac{3x}{4}$$

$$x = 2$$

$$y = 1.5$$

33.



$$xy = 384$$

$$y = \frac{384}{x}$$

$$A = 288 + 12x$$

$$y = 8$$

$$A' = \frac{12(b^2 - 16b + 12)}{(b-8)^2}$$

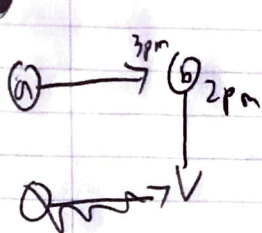
$$(b-8)^2$$

$$(24, 36)$$

$$A' = \frac{384}{x} + 8 - \frac{384(x+12)}{x^2}$$

$$(x+12) \left( \frac{384}{x} + 8 \right)$$

$$\frac{384}{x} + 8 + \frac{384 \cdot 12}{x^2}$$



$$D = \sqrt{(ax - bx)^2 + (ay + by)^2}$$

$$bx = 200$$

$$by = 20x$$

(a)

(a) 0, 0

During journey

(a) 12, 20

(b) 200, -20

(b) 0, -4

$$ay = 0$$

$$ax = 15 + \frac{15}{x}$$

$$by = -\frac{20}{x}$$

$$bx = 0$$

$$\sqrt{\left(\frac{15}{x} - 15\right)^2 + \left(-\frac{20}{x}\right)^2}$$

$$\sqrt{625x^2 - 450x + 225}$$

$$f'(x) = \frac{1250x - 450}{\sqrt{625x^2 - 450x + 225}}$$

$$\sqrt{625x^2 - 450x + 225}$$

$$x = \frac{450}{1250} \text{ h}$$

Closest at

2:21:36

62.

$$C = (100 - x)(10x + 800)$$

$$C' = -10x - 800 + 1000 - 10x$$

$$C' = 200 - 20x$$

$$x = 10$$

$$f(10) = 800 \times 10$$

$$f(10) = 900 \times 90$$

$$f(100) = 0$$

$f(10)$  is the local maximum