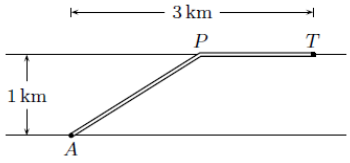
(4) 13. Find the absolute extrema of $f(x) = (2x - 1)\sqrt[3]{x}$ on $[-1, 1]$.

(5) 14. An oil company has a refinery at point A on the bank of a straight river 1 kilometer wide. It is going to run a pipe from point A to point P somewhere on the opposite side of the river, and then straight along the river to a tank T situated 3 kilometers downstream from A. It costs 15 thousand dollars per kilometer to run the pipe under the water and 9 thousand dollars per kilometer to run the pipe along the bank. What should be the distance from P to T in order to minimize the total cost of the pipe?



13. Santa Claus has a piece of land on which he would like to grow apples. Research has shown that if he plants 24 trees, each tree will produce 600 apples per year. For each additional tree planted, the number of apples on each tree will decrease by 12 apples per year. How many trees should Santa plant to maximize his apple production?

Be sure to justify your work.

UNB: Winter 2009

37 trees Apples Produced = (# of Trees)(Apples Produced)

6. Find the absolute minimum value of

$$f(x) = x - \frac{4x}{x+1}$$

on the interval $[0, 3]$

Penn University: Fall 2011

A) 0 B) 1 C) -1 D) 2

E) -2 F) $\frac{1}{2}$ G) $-\frac{1}{2}$ H) 3

)

13. Santa Claus has a piece of land on which he would like to grow apples. Research has shown that if he plants 24 trees, each tree will produce 600 apples per year. For each additional tree planted, the number of apples on each tree will decrease by 12 apples per year. How many trees should Santa plant to maximize his apple production?

Be sure to justify your work.

Let x Rep. # of trees beyond 24

Production = $(24+1x)(600-12x)$

$P = (1)(600-12x)+(24+x)(-12)$

$0 = 600-12x-288-12x$

$\frac{-312}{-24} = \frac{-24x}{-24}$

$13 = x$

∴ Plant 37 trees

6. Find the absolute minimum value of

$$f(x)=x-\frac{4x}{x+1}$$

on the interval $[0,3]$

A) 0 B) 1 C) -1 D) 2

E) -2 F) $\frac{1}{2}$ G) $-\frac{1}{2}$ H) 3

$$f'(x)=1-\frac{4(x+1)-(4x)(1)}{(x+1)^2}$$

$[0,3]$

$$0=1-\frac{4x+4-4x}{(x+1)^2}$$

$x=-1$ is not in domain

$$0=1-\frac{4}{(x+1)^2}$$

$$\frac{4}{(x+1)^2}=\frac{1}{1}$$

$$\sqrt{(x+1)^2}=\sqrt{4}$$

$$x+1=\pm 2$$

$$x=-1\pm 2$$

$x=-3$ or $x=1$

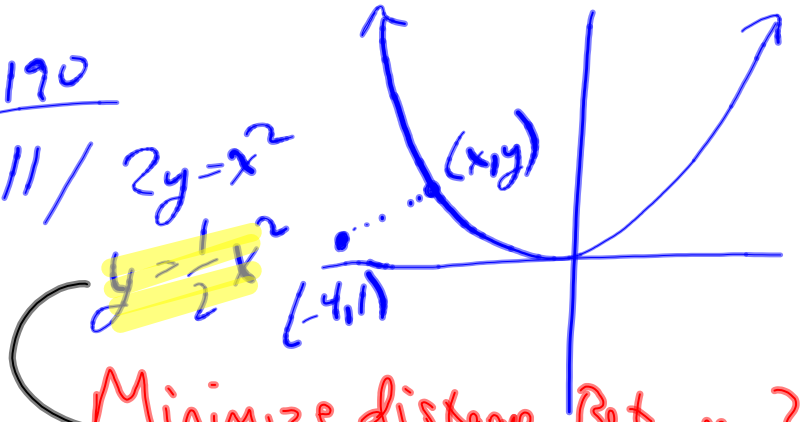
Only in $[0,3]$

x	y
0	0
1	-1 ← Abs. Minimum
3	0

Pg. 190

#11 / $2y = x^2$

$y = \frac{1}{2}x^2$



Minimize distance Between 2 pts.

$d = \sqrt{(x+4)^2 + (y-1)^2}$ $\quad d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

$d = \sqrt{(x+4)^2 + \left(\frac{1}{2}x^2 - 1\right)^2}$

$d' = \frac{1}{2}\left((x+4)^2 + \left(\frac{1}{2}x^2-1\right)^2\right)^{-1/2}\left[2(x+4) + 2\left(\frac{1}{2}x^2-1\right)(x)\right]$

$0 = \frac{2x + 8 + 2x\left(\frac{1}{2}x^2-1\right)}{2\sqrt{(x+4)^2 + \left(\frac{1}{2}x^2-1\right)^2}}$

Set Num. = 0

$2x + 8 + x^3 - 2x = 0$

$x^3 + 8 = 0$

$\sqrt[3]{x^3} = \sqrt[3]{-8}$

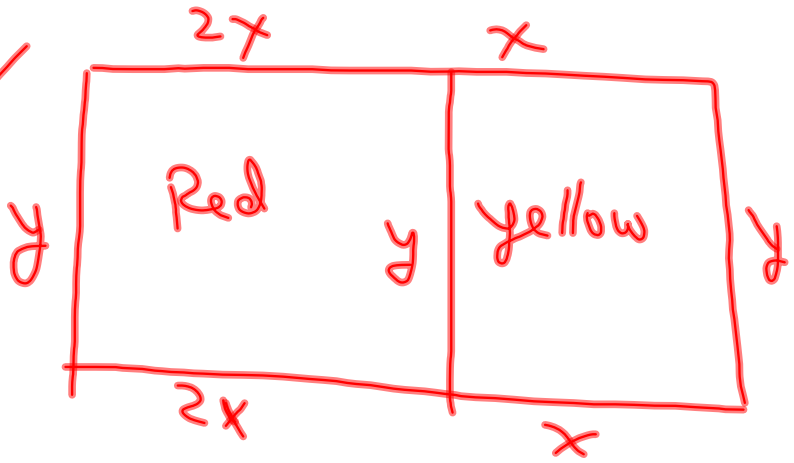
$x = -2 \Rightarrow y = \frac{1}{2}(-2)^2$

$y = 2$

$(-2, 2)$

Practice Test: 2005

#4/



$3x+3x+3y=240$

$6x+3y=240$

$\frac{3y}{3}=\frac{240}{3}-\frac{6x}{3}$

$y=80-2x$

$A=3xy$

$A=3x(80-2x)$

$A=240x-6x^2$

$A'=240-12x$

$0=240-12x$

$\frac{12x}{12}=\frac{240}{12}$

$x=20$

$y=80-2(20)$

$y=40$

$Area=60\times 40$

$=2400\,m^2$