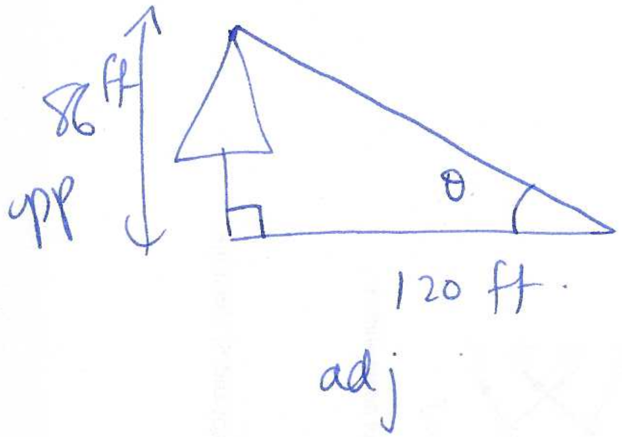


$$\sin\theta = \frac{opp}{hyp}$$

$$\cos\theta = \frac{adj}{hyp}$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{opp}{adj}$$

$$\tan\theta = \frac{86}{120} \qquad \theta = \tan^{-1}\left(\frac{86}{120}\right)$$

$$\theta \simeq 0.622 \times \frac{180}{\pi}$$

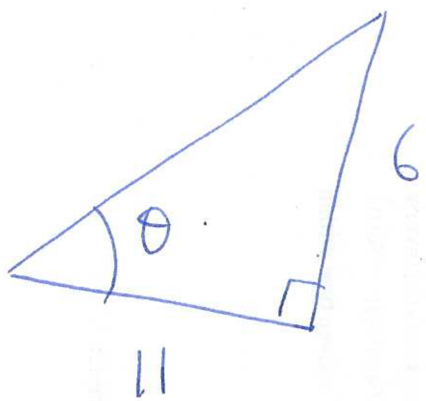
atan

arctan

radians

degrees $\rightarrow$ 35.6°

2

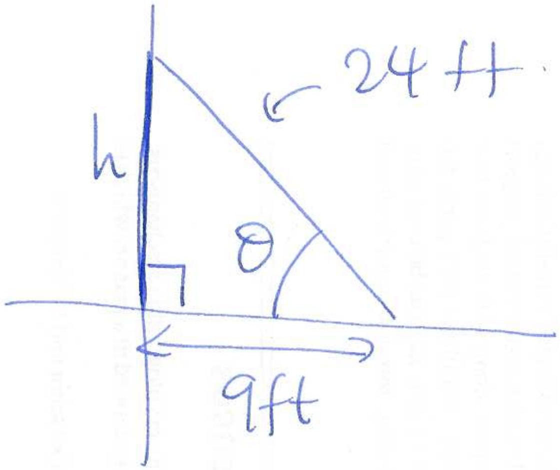


· find θ (in degrees).

$$\tan\theta = \frac{6}{11}.$$

$$\theta = \tan^{-1}(6/11) \left(* \frac{180}{\pi}\right).$$

$$= 28.6^\circ.$$



$$\cos\theta = \frac{adj}{hyp} = \frac{9}{24}$$

$$\theta = \cos^{-1}(9/24) \times \frac{180}{\pi}$$

acos

arcos.

$$\theta \approx 68.0^{\circ}$$

1

$$h^2 + 9^2 = 24^2$$

$$h^2 = 24^2 - 9^2$$

$$h = \sqrt{24^2 - 9^2} = 22.2\text{ ft}$$

2

$$\frac{h}{24} = \sin(68.0)$$

$$h = 24 \times \sin\left(68.0 \times \frac{\pi}{180}\right)$$

22.2...

$\theta = \underbrace{\frac{\pi}{3}}_{\text{radians.}}$ $\quad \sin(2\theta) \quad 2\sin(\theta).$

θ	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin\theta$	0	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2}$

$\sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$

$$2\sin(\theta) = 2\sin\left(\frac{\pi}{3}\right) = \frac{2\sqrt{3}}{2} = \sqrt{3}.$$

$\sin\left(\frac{2\pi}{3}\right).$

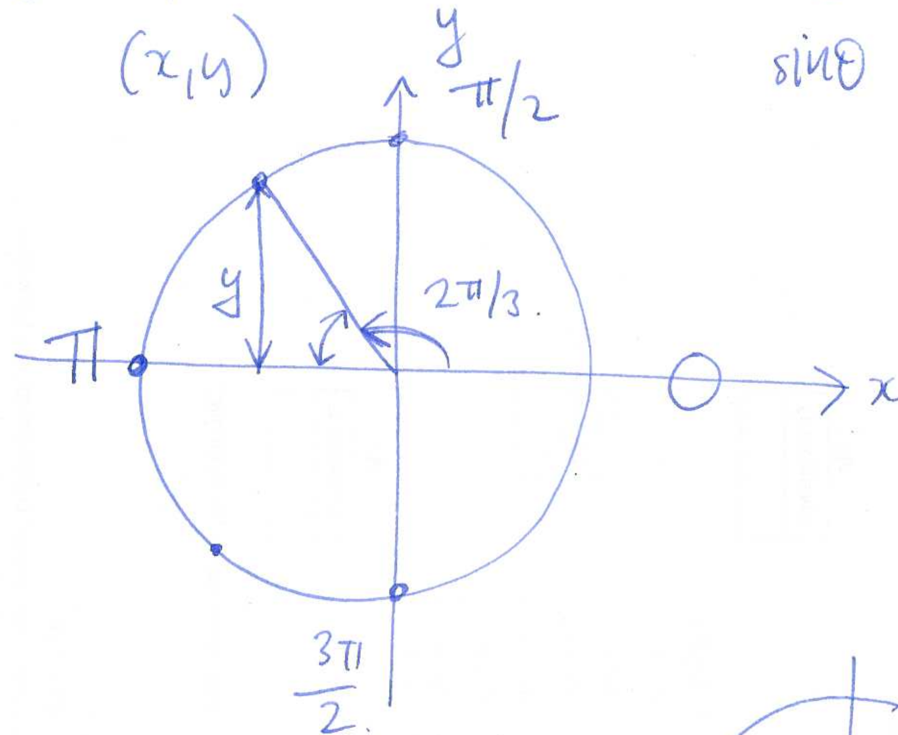
$\sin\left(\frac{2\pi}{3}\right)$.

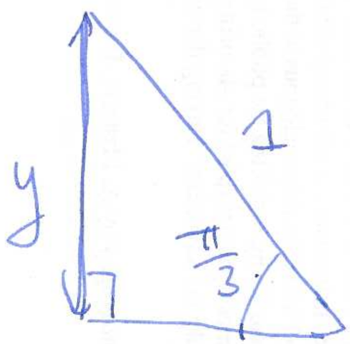
$(\cos\theta, \sin\theta)$.

(x, y)

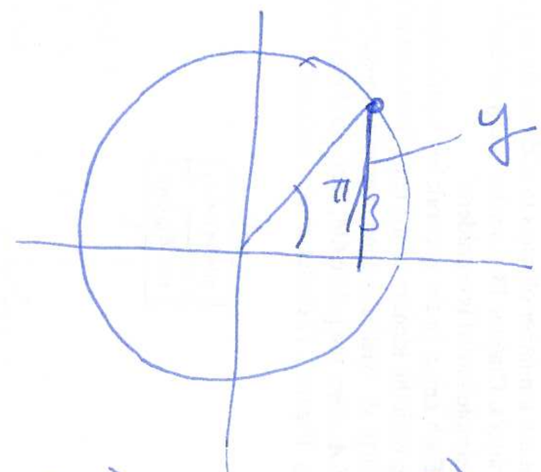
θ	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin\theta$	0	$\sqrt{1}/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	$\sqrt{4}/2$

5





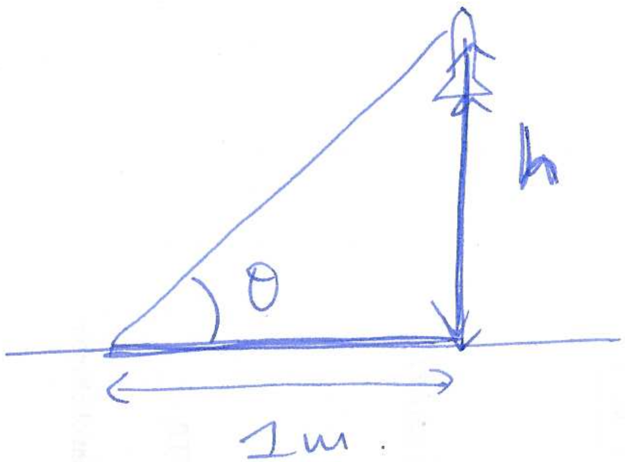
$$\pi - \frac{2\pi}{3} = \frac{\pi}{3}.$$



$$\sin\left(\frac{2\pi}{3}\right) = \sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$$

6

$1 \text{ mile} = 5280 \text{ ft}$



$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

40°
60°
80°
85°.

$$= \frac{opp/hyp}{adj/hyp} = \frac{opp}{adj}$$

$$\tan\theta = \frac{h}{5280}$$

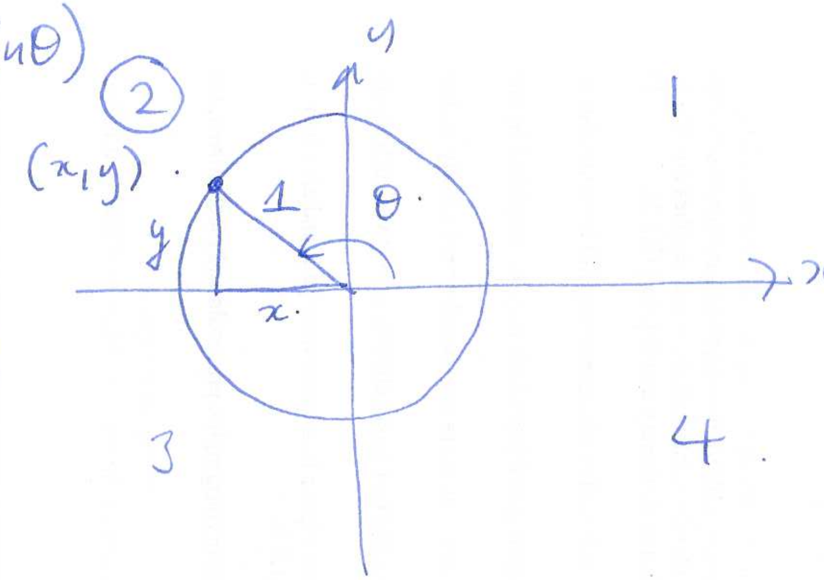
$$h = 5280 \tan\theta$$

θ	40°	60°	80°	85°	degrees
h	4430 ft	9145	29,944	60,351	ft

cosec (θ) cot (θ) in quadrant 2.

$$\frac{1}{\sin\theta} = \mathrm{cosec}(\theta)$$

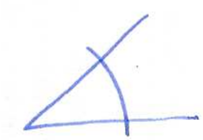
$(\cos\theta, \sin\theta)$



$$\frac{1}{\cos\theta} = \sec(\theta)$$

$$x^2 + y^2 = 1$$

$$\frac{1}{\tan\theta} = \cot(\theta)$$



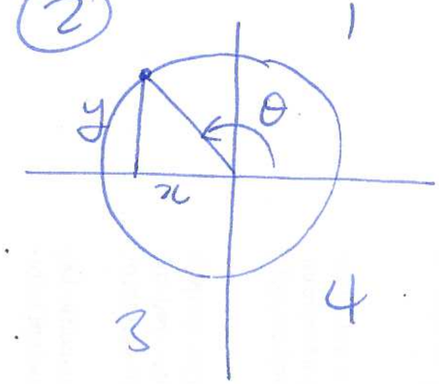
eigen value.

$$\mathrm{cosec}(\theta) = \frac{1}{\sin\theta} = \frac{1}{y}$$

$$\cot(\theta) = \frac{1}{\tan\theta} = \frac{\cos\theta}{\sin\theta} = \frac{x}{y}.$$

$$\operatorname{cosec}(\theta) = \frac{1}{\sin\theta} = \frac{1}{y}$$

$$\cot(\theta) = \frac{\cos\theta}{\sin\theta} = \frac{x}{y}.$$



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

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

$$\operatorname{cosec}^2(\theta) = \cot^2(\theta) + 1$$

$$\operatorname{cosec}(\theta) = \pm\sqrt{\cot^2(\theta) + 1}. \qquad \cot^2(\theta) + 1 = \operatorname{cosec}^2(\theta).$$

(which one? depends on quadrant.

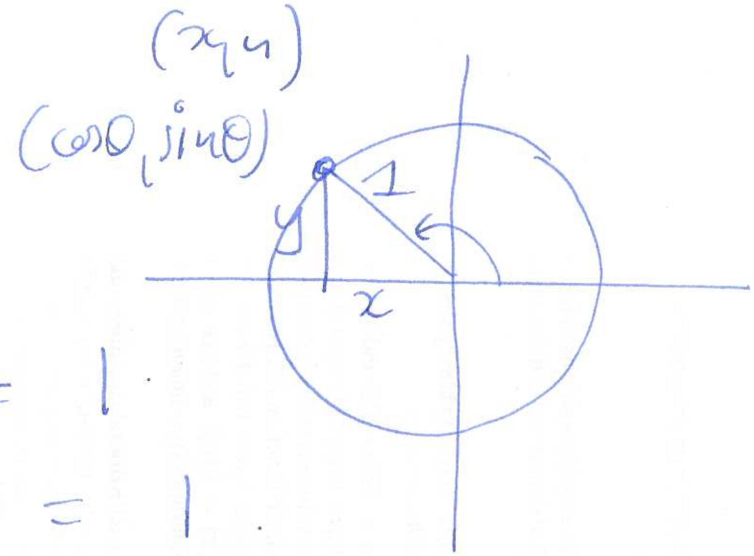
Q2

$$\operatorname{cosec}(\theta) = \sqrt{\cot^2\theta + 1}.$$

$\cot(\theta) \quad \sin(\theta) \quad Q2$

$\cot(\theta) = \dfrac{y}{x} = \dfrac{-ve}{+ve}$

$\sin(\theta) = y$



$$x^2 + y^2 = 1$$

$$\frac{\cos^2\theta + \sin^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta}$$

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

$$\cot^2(\theta) + 1 = \frac{1}{\sin^2\theta}$$

Q: which one?

$$\cot^2(\theta) = \frac{1}{\sin^2\theta} - 1$$

$$\cot(\theta) = \pm\sqrt{\frac{1}{\sin^2\theta} - 1} = -\sqrt{\frac{1}{\sin^2\theta} - 1}$$

$\theta = \frac{\pi}{3}$

θ	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin\theta$	0	$\sqrt{1}/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	$\sqrt{4}/2$

$\sin(2\theta)$

$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$

$\boxed{6\sin(\theta)}$

$6 \times \sin\left(\frac{\pi}{3}\right) = 6 \times \frac{\sqrt{3}}{2} = 3\sqrt{3}$

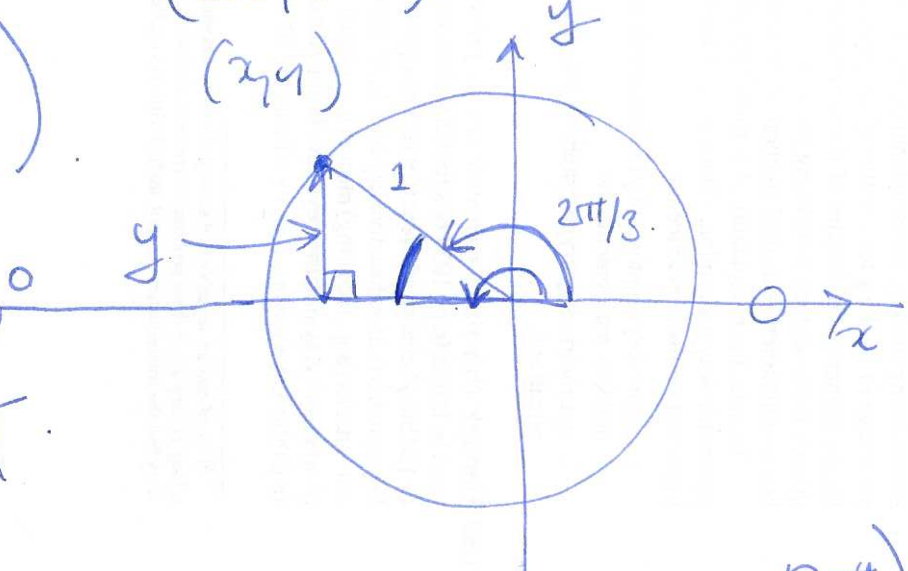
$(\cos\theta, \sin\theta)$

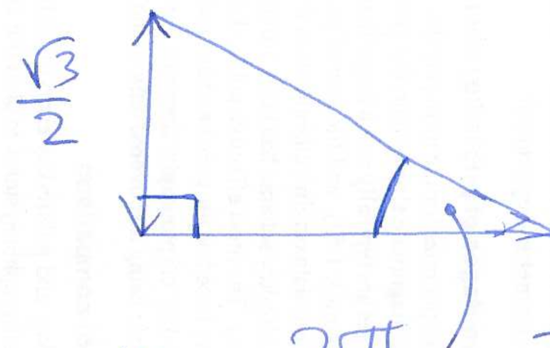
(x, y)

$\sin\left(\frac{2\pi}{3}\right)$

$180°$

π

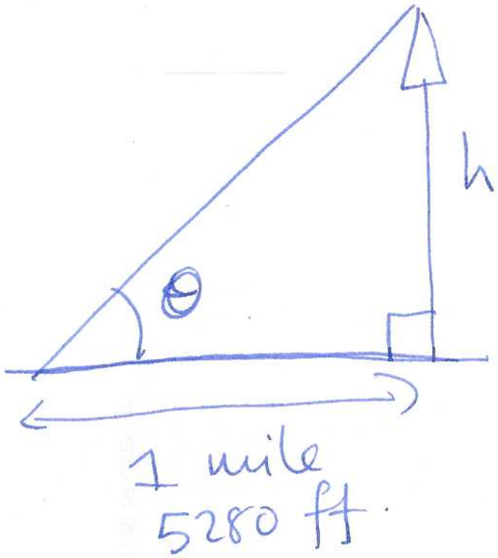




$\pi - \frac{2\pi}{3} = \frac{\pi}{3}$

$\sin\left(\frac{2\pi}{3}\right) = \sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$

$360° = 2\pi$

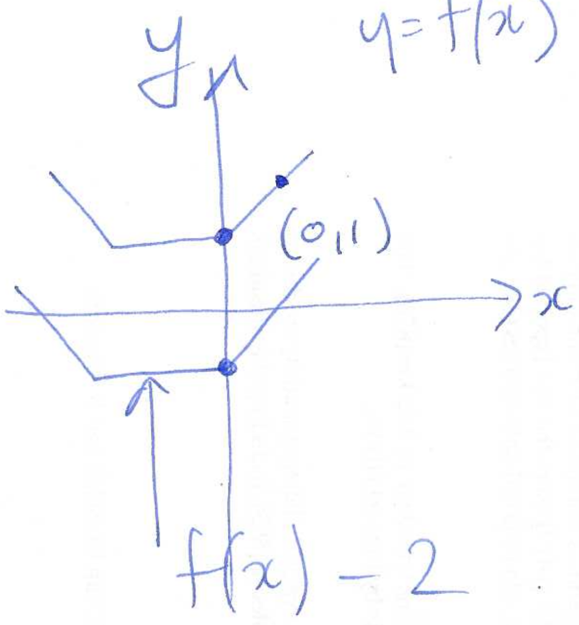


θ	35°	60°	75°	85°
	3697	9145	19,705	60,351

$$\tan\theta = \frac{opp}{adj} = \frac{h}{5280}$$

$$\boxed{h = 5280\tan\theta}$$

$$5280 \times \tan\left(\theta \times \frac{\pi}{180}\right).$$

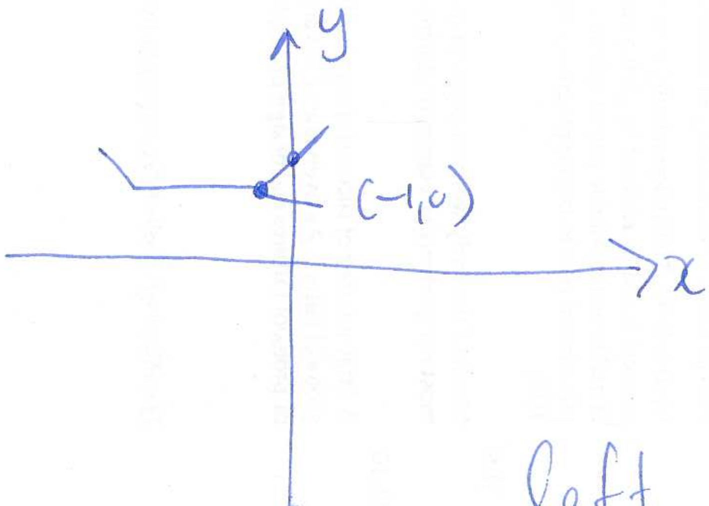


1. draw $f(x) - 2$.

$(0,1)$ $f(0) = 1$.

$f(0) - 2 = 1 - 2 = -1$.

2. draw $f(x+1)$



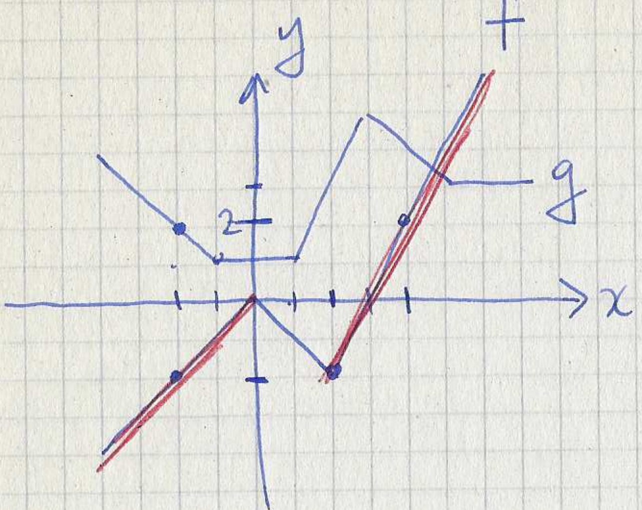
$(0,1)$ $f(0) = 1$.

$f(0+1) = f(1) = 2$

left shift by 1.

$f(-1+1) = f(0) = 1$.

(13)



i) $(f-g)(2)$ ii) $(g\circ f)(4)$

iii) $(f\circ g)(-2)$ iv) $f(x)$ increasing

i) $(f-g)(2) = f(2) - g(2)$

$-2 - 3 = -5.$

ii) $(g\circ f)(4) = g(f(4)) = g(2) = 3.$

iii) $(f\circ g)(-2) = f(g(-2)) = \cancel{f(-2)}$

$= f(2) = -2$

iv) f increasing $(-4,0) \cup (2,4)$

$(-\infty, 0) \cup (2, \infty).$

draw, find x,y intercepts

$2x - 3y = 6$

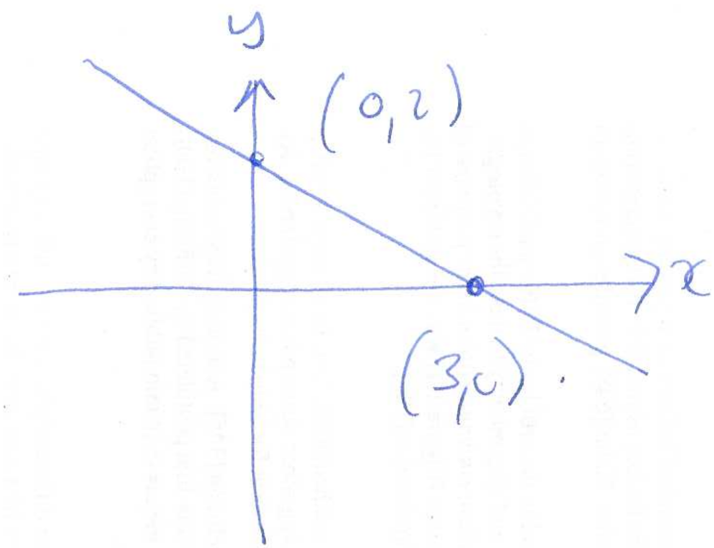
$+3y \quad +3y$

$2x = 6 - 3y$

$-6 \quad -6$

$\frac{2x-6}{-3} = \frac{-3y}{-3}$

$-\frac{2}{3}x + 2 = y$



$y = -\frac{2}{3}x + 2$

y-intercept: $x = 0 \quad y = 2 \quad (0,2)$

$0 = -\frac{2}{3}x + 2$

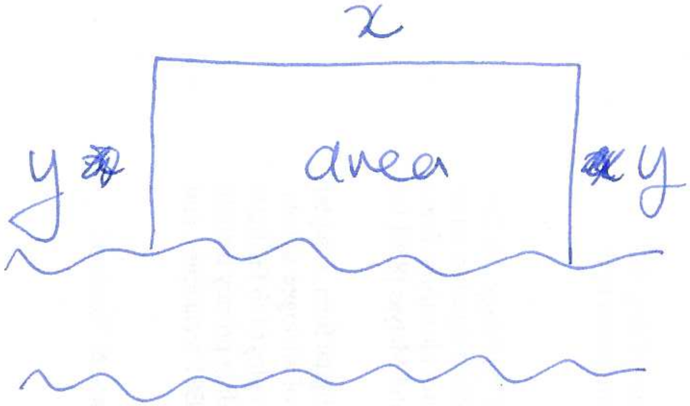
$+\frac{2}{3}x \quad +\frac{2}{3}x$

$\frac{3}{2} \times \frac{2}{3}x = 2 \times \frac{3}{2}$

$x = 3$

x-intercept 3

$(3,0)$

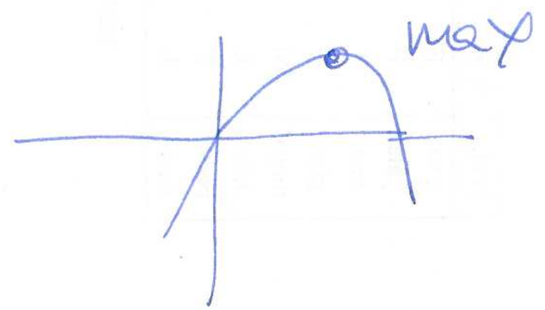


400 ft of fence.
largest area.

$$x + 2y = 400$$
$$x = 400 - 2y$$

area $A = xy =$

max $A = (400-2y)y = 400y - 2y^2$.



complete the square.

(16)

$400y - 2y^2.$

$x + 2y = 400$

$-2y^2 + 400y$

$-2\left[y^2 - 200y\right].$

$-2\left[(y-100)^2 - 100^2\right]$

$-2\left[y^2 - 200y + 100^2 - 100^2\right]$

$y = 100$

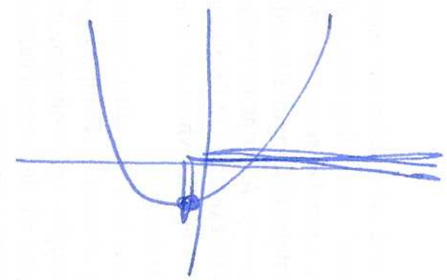
$x + 200 = 400$

$x = 200$

$A = xy = 100 \times 200 = 20{,}000.$

find inverse functions

$$f(x) = (2x+1)^2 \qquad y = (2x+1)^2$$



$$\sqrt{y} = 2x+1$$
$$-1 \qquad -1$$

$$\frac{\sqrt{y}-1}{2} = \frac{2x}{2}$$

inverse on $(-\frac{1}{2}, \infty)$

$$x = \frac{\sqrt{y}-1}{2}$$

18

$$f(x) = e^{3x-2} - 6$$

$$\boxed{\begin{aligned} \ln(e^{x}) &= x \\ e^{\ln(x)} &= x \end{aligned}}$$

$$y = e^{3x-2} - 6$$

$$+6 \qquad +6$$

$$y+6 = e^{3x-2}$$

$$\ln(y+6) = \ln(e^{3x-2})$$

$$\ln(y+6) = 3x - 2$$

$$+2 \qquad +2$$

$$\frac{\ln(y+6)+2}{3} = \frac{3x}{3}$$

$$x = \frac{\ln(y+6)+2}{3}$$

$f(x) = \sin 2x \qquad g(x) = 3^{x-1}.$

i) $f \circ g(x) = f(g(x)) = \sin\left(2 \times 3^{x-1}\right).$

ii) $g \circ f(x) = g(f(x)).$

$= 3^{(\sin(2x) - 1)}.$