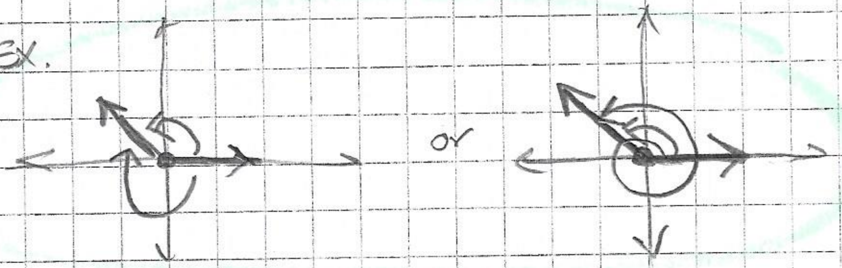
Semester 2 Final Exam Review SOLUTIONS

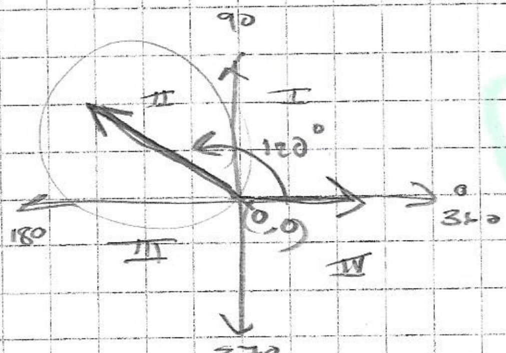
1.) Coterminal angles - must be in standard position with the "hands" in the same location but angle measured not the same

Ex.



3.) $\theta = \dfrac{2\pi}{3}$

$\dfrac{2\pi}{3}\left(\dfrac{180}{\pi}\right) = 120^\circ$



Q2

out of order

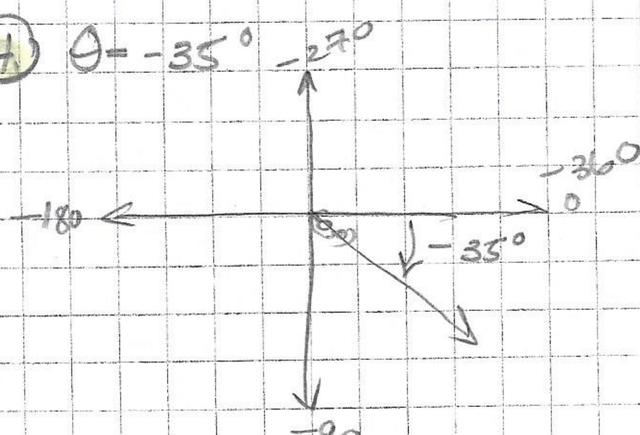
2.) $\theta = \dfrac{2\pi}{15}$

$\dfrac{2\pi}{15}\left(\dfrac{180}{\pi}\right) = 24^\circ$

$90^\circ - 24^\circ = 66^\circ$ compliment

$\dfrac{66}{1}\left(\dfrac{\pi}{180}\right) = \dfrac{66}{180}\pi = \boxed{\dfrac{11\pi}{30}}$

4) $\theta = -35^\circ$

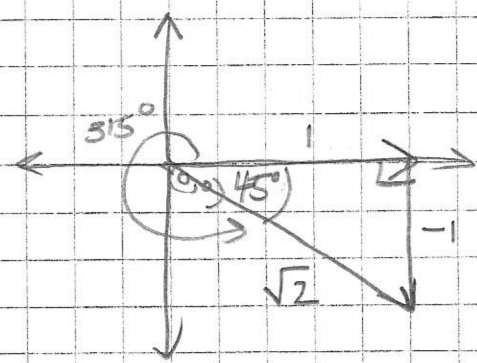


Q IV

(5.) $\cos\left(\frac{7\pi}{4}\right)$ use trig card $= \boxed{\frac{\sqrt{2}}{2}}$

or draw triangle and use referance angle

315°



S-OH C-AH T-OA

$\cos 315° = \frac{1}{\sqrt{2}} \cdot \left(\frac{\sqrt{2}}{\sqrt{2}}\right) = \boxed{\frac{\sqrt{2}}{2}}$

(6.) $\cot \theta = \frac{8}{15}$ find $\tan \theta$.

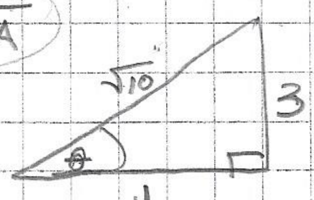
cot and tan are reciprocals so

$\boxed{\tan \theta = \frac{15}{8}}$

(7.) $\sec \theta = \frac{\sqrt{10}}{1}$ find $\tan \theta$.

$\sec \frac{H}{A}$

$\tan \frac{O}{A}$



$\boxed{\tan \theta = \frac{3}{1}}$

$1^2 + b^2 = (\sqrt{10})^2$

$1 + b^2 = 10$

$b^2 = 9$

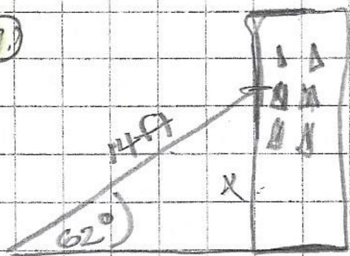
$b = 3$

8.) csc 3.1

*make sure calc is in radian mode as 3.1 is radians not degrees.

* csc is the reciprocal of sin so: $\csc 3.1 = \frac{1}{\sin 3.1} = \boxed{24.0496}$

9.)



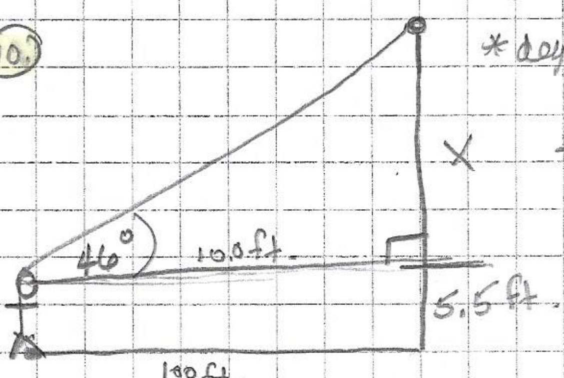
* make sure calc is in degree mode since using 62°

$\sin 62° = \frac{x}{14}$

$x = 14 \sin 62°$

$\boxed{x = 12.361 \text{ ft tall}}$

10.)



* degree mode

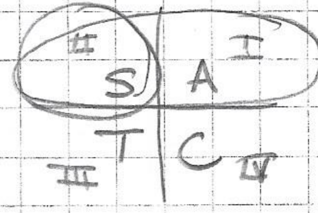
$\tan 46° = \frac{x}{100}$

$x = 100 \tan 46$

$x = 103.55$

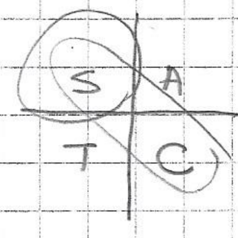
$x + 5.5 = \boxed{109.05 \text{ ft. tall}}$

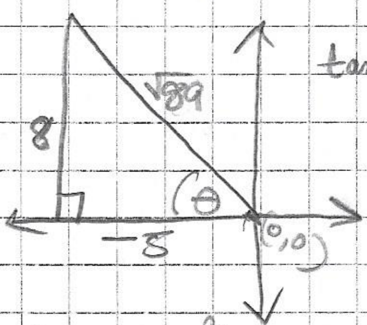
11.) $\sin\theta > 0$ AND $\tan\theta < 0$



$\boxed{\theta \text{ is in QII}}$

12. $\tan\theta = -\dfrac{8}{5}$ $\underline{\underline{\text{AND}}}$ $\sin\theta < 0$ (tan is neg in Q II + IV, sin is neg in Q II)





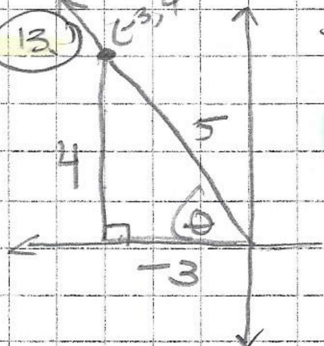
$\tan\theta = -\dfrac{8}{5}$ O/A

$\cos\theta = -\dfrac{5}{\sqrt{89}}$

$64 + 25 = c^2$
$89 = c^2$
$\sqrt{89} = c$

$\boxed{\cos\theta = \dfrac{-5\sqrt{89}}{89}}$

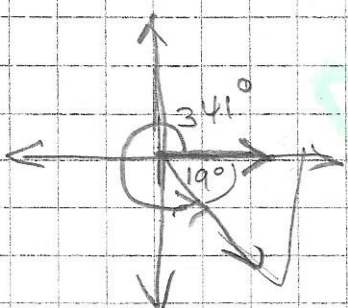
13. $(-3, 4)$



$S - \dfrac{O}{H}$

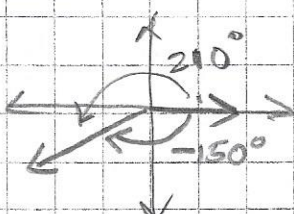
$\boxed{\sin\theta = \dfrac{4}{5}}$

14. $\theta = 341°$



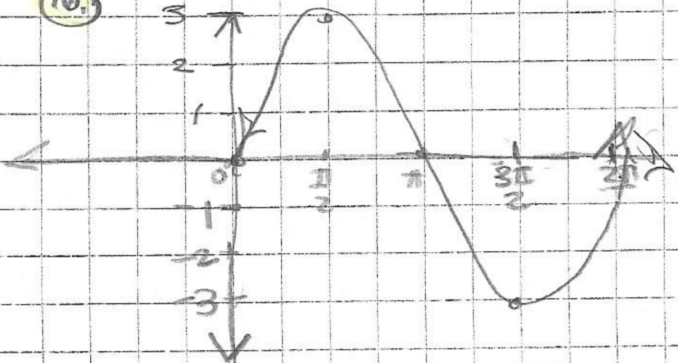
$\boxed{\theta' = 19°}$

15. $\csc(-150°)$ * use trig card to find $\underline{\underline{\text{exact}}}$



$\boxed{\csc 210° = -2}$

16.



Amp = 3

Period = 2π

midline = 0

shift = 0

$y = a \sin b(x-c) + d$

$|a|$ = amplitude

period = $\frac{2\pi}{b}$

c = phase shift

d = midline

$\boxed{y = 3 \sin x}$

17. $a = 2.5$

period = 2π

$\frac{2\pi}{b} = \frac{2\pi}{1}$

$b = 1$

$y = 2.5 \cos x$

amplitude = 2.5
period = 2π

no shift or midline

18. amplitude = 5.5 , period = $\frac{5\pi}{3}$

* function can be sine or cosine
* amplitude is 5.5 so $|a| = \pm 5.5$

period = $\frac{2\pi}{b} = \frac{5\pi}{3}$

$6\pi = 5\pi b$

$\frac{6\pi}{5\pi} = b$

$\frac{6}{5} = b$

can be any of:

$y = -5.5 \cos \frac{6}{5} x$

$y = 5.5 \cos \frac{6}{5} x$

$y = -5.5 \sin \frac{6}{5} x$

$y = 5.5 \sin \frac{6}{5} x$

all are correct

(19.)

$\csc\beta \sin\beta$

$\left(\frac{1}{\sin\beta}\right)\frac{\sin\beta}{1}$

$\boxed{1}$

(20.)

$\cos^2 x \sec^2 x - \cos^2 x$

$\cos^2 x\left(\sec^2 x - 1\right)$

$\cos^2 x\left(\tan^2 x\right)$

$\frac{\cos^2 x}{1}\left(\frac{\sin^2 x}{\cos^2 x}\right)$

$\boxed{\sin^2 x}$

(21.)

$\frac{\cos^2 x}{1-\sin^2 x} = 1$

$\frac{\cos^2 x}{1-\sin^2 x} = \frac{\cos^2 x}{\cos^2 x}$ Substitute $\cos^2 x$ for $1-\sin^2 x$ pythag ID

$= \boxed{1}$

(22.) $\frac{1-\cos u}{\sin u} + \frac{\sin u}{1-\cos u} = \frac{(1-\cos u)(1-\cos u)}{\sin u(1-\cos u)} + \frac{\sin u}{1-\cos u}\frac{(\sin u)}{(\sin u)}$ common denominator

$= \frac{\cos^2 u - 2\cos u + 1 + \sin^2 u}{\sin u(1-\cos u)}$

	1	$-\cos u$
1	1	$-\cos u$
$-\cos u$	$-\cos u$	$\cos^2 u$

$\cos^2 u - 2\cos u + 1$

$= \frac{(\cos^2 u + \sin^2 u) - 2\cos u + 1}{\sin u(1-\cos u)}$

$= \frac{1 - 2\cos u + 1}{\sin u(1-\cos u)}$

$= \frac{2 - 2\cos u}{\sin u(1-\cos u)}$

$= \frac{2\cancel{(1-\cos u)}}{\sin u\cancel{(1-\cos u)}}$

$= \frac{2}{\sin u}$

$= 2\left(\frac{1}{\sin u}\right)$

$= \boxed{2\csc u}$

23.

$$\tan^2 t\left(\sec^2 t - 1\right) = \tan^2 t\left(\tan^2 t\right)$$
$$= \boxed{\tan^4 t}$$

24.

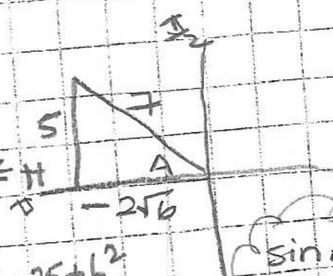
$$\cos(165^\circ) = \cos(120^\circ + 45^\circ) = \cos 120 \cos 45 - \sin 120 \sin 45$$
$$= \left(-\tfrac{1}{2}\right)\left(\tfrac{\sqrt{2}}{2}\right) - \left(\tfrac{\sqrt{3}}{2}\right)\left(\tfrac{\sqrt{2}}{2}\right)$$
$$= \boxed{-\frac{\sqrt{2}}{4} - \frac{\sqrt{6}}{4}}$$
or $\frac{-\sqrt{2}-\sqrt{6}}{4}$ or $-\frac{1}{4}\left(\sqrt{2}+\sqrt{6}\right)$

25.

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$
$$= \left(\frac{-2\sqrt{6}}{7}\right)\left(\frac{-5}{6}\right) + \left(\frac{5}{7}\right)\left(\frac{-\sqrt{11}}{6}\right) = \boxed{\frac{10\sqrt{6}}{42} + \frac{5\sqrt{11}}{42}}$$

$\sin A = \frac{5}{7}$

$\frac{\pi}{2} \le A \le \pi$



$49 = 25 + b^2$

$24 = b^2$

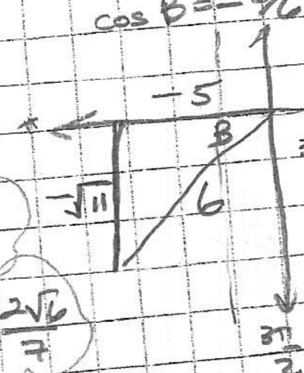
$\sqrt{24} = b$

$2\sqrt{6} = b$

$\sin A = \frac{5}{7}$

$\cos A = \frac{-2\sqrt{6}}{7}$

$\cos B = -\frac{5}{6}$ $\quad \pi \le B \le \frac{3\pi}{2}$



$36 = 25 + b^2$

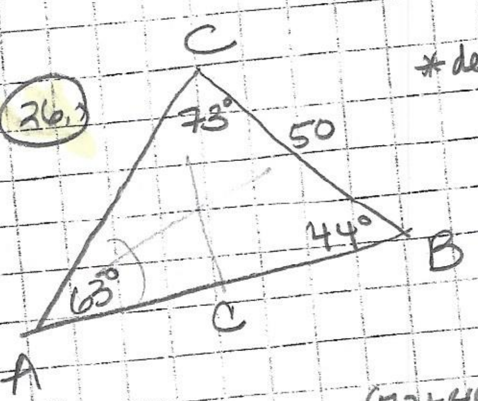
$11 = b^2$

$\sqrt{11} = b$

$\sin B = -\frac{\sqrt{11}}{6}$

$\cos B = \frac{-5}{6}$

26.



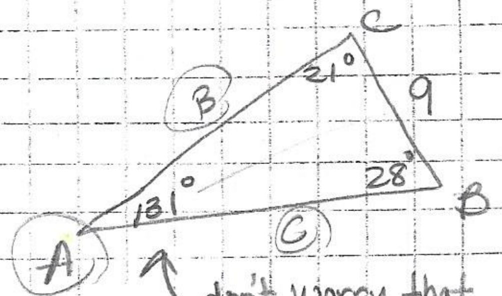
*degree mode

$$\frac{c}{\sin 73} = \frac{50}{\sin 63}$$
$$c \sin 63 = 50 \sin 73$$
$$c = \frac{50 \sin 73}{\sin 63}$$
$$\boxed{c \approx 53.66}$$

$\angle A = 180 - (73 + 44)$

$\angle A = 63^\circ$

27. $B = 28°$, $C = 21°$, and $a = 9$ * degree mode



don't worry that the sketch isn't accurate

$\boxed{\angle A = 131°}$

$$\frac{c}{\sin 21} = \frac{9}{\sin 131}$$

$$c = \frac{9 \sin 21}{\sin 131}$$

$$\boxed{c \approx 4.27}$$

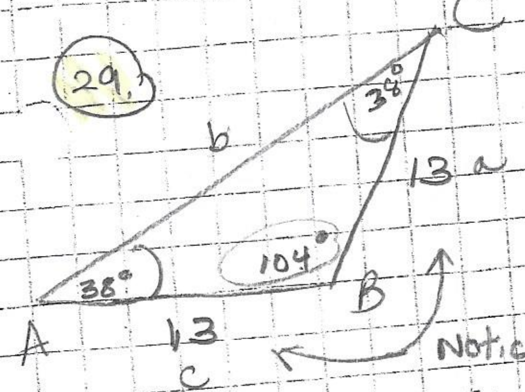
$$\frac{b}{\sin 28} = \frac{9}{\sin 131}$$

$$b = \frac{9 \sin 28}{\sin 131}$$

$$\boxed{b \approx 5.60}$$

28. skip

29. * degree mode



Notice this is an iscoceles triangle so it is possible to use Law of Sines also

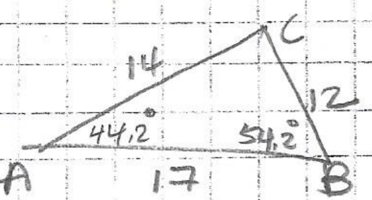
Law of Cosines:

$$b = \sqrt{13^2 + 13^2 - 2(13)(13)\cos 104}$$

$$\boxed{b \approx 20.49}$$

* degree mode

30. $a=12,\ b=14,\ c=17$



$\angle A = \cos^{-1}\left(\dfrac{(14^2+17^2-12^2)}{2(14)(17)}\right)$

make sure to use ( ) for numerator and denominator

$\boxed{\angle A = 44.2^\circ}$

$\dfrac{\sin B}{14} = \dfrac{\sin 44.2}{12}$

$\sin B = \dfrac{14 \sin 44.2}{12}$

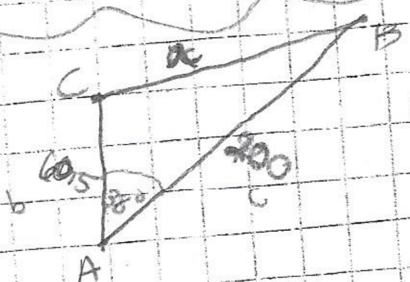
$\angle B = \sin^{-1}\left(\dfrac{14 \sin 44.2}{12}\right)$

$\boxed{\angle B = 54.4^\circ}$

$\angle C = 180 - (44.2 + 54.4)$

$\boxed{\angle C \approx 81.4}$

31.



Law of cosines

$a = \sqrt{60.5^2 + 200^2 - 2(60.5)(200)\cos 38}$

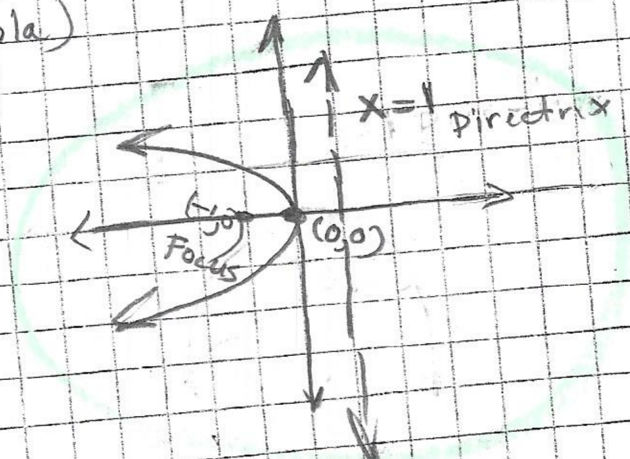
$\boxed{a \approx 156.81 \text{ ft}}$

32. $x = -\frac{1}{4}y^2$ (parabola)

$y^2 = -4x$

$-4 = 4p$

$-1 = p$



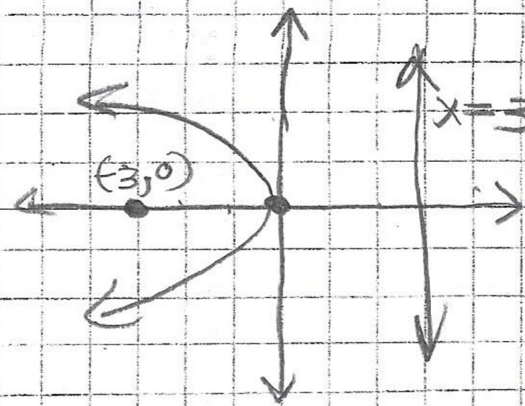
33. $x = -\frac{1}{12}y^2$

$y^2 = -12x$

$-12 = 4p$

$-3 = p$

$\boxed{\text{focus } (-3,0) \quad \text{Directrix: } x = 3}$



34. $a=9$, $b=2$

center $(0,0)$

$\boxed{\frac{y^2}{81} + \frac{x^2}{4} = 1}$

35.

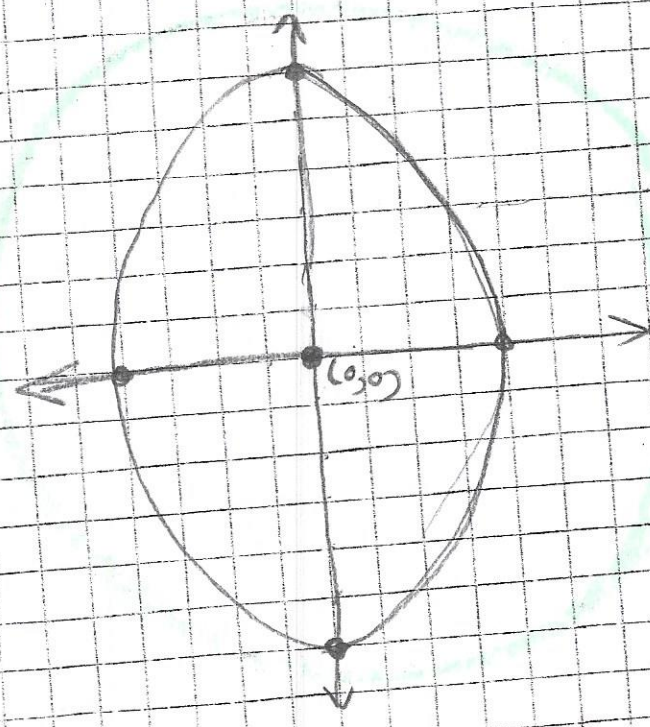
$\frac{36x^2}{576} + \frac{16y^2}{576} = \frac{576}{576}$

$\frac{x^2}{16} + \frac{y^2}{36} = 1$

$\frac{y^2}{36} + \frac{x^2}{16} = 1$

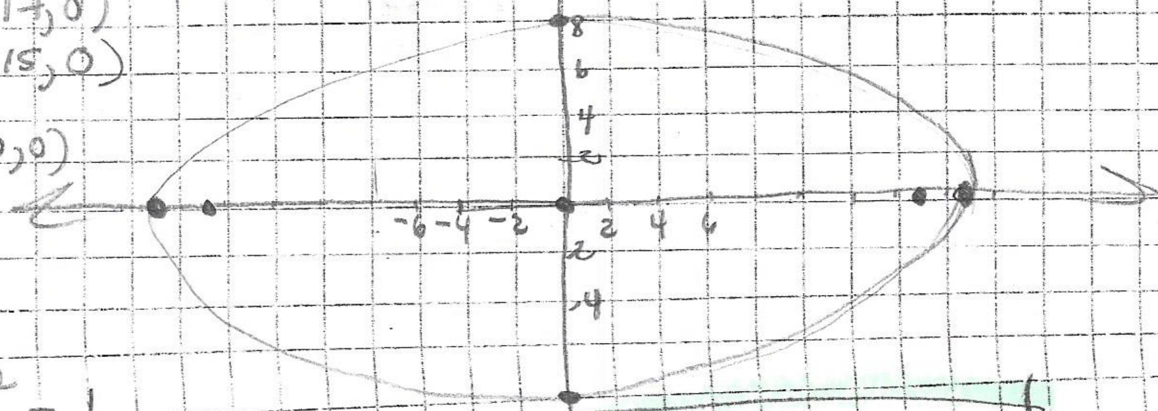
$a=6 \quad b=4$

center $(0,0)$



36a) vert $(\pm 17, 0)$
foci $(\pm 15, 0)$

center $(0,0)$



$a = 17$

$$\frac{x^2}{17^2} + \frac{y^2}{b^2} = 1$$

$a^2 = 289$
$b^2 = ?$
$c^2 = 225$

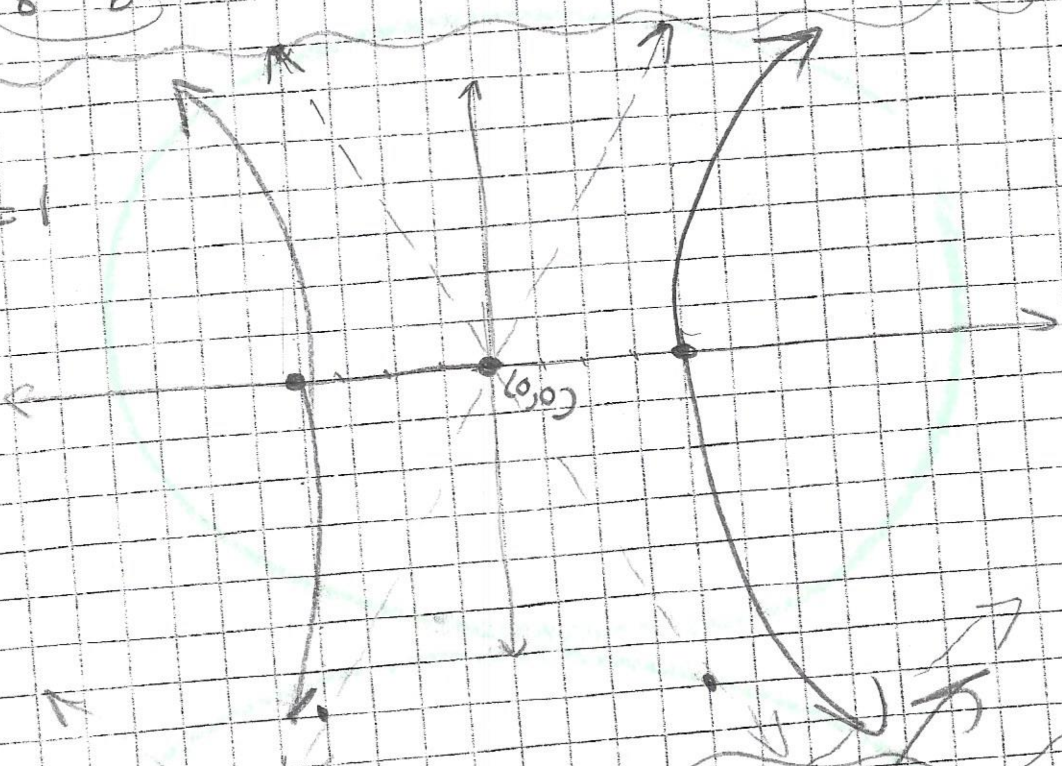
$a^2 = b^2 + c^2$
$289 = b^2 + 225$
$64 = b^2$
$8 = b$

$$\boxed{\frac{x^2}{289} + \frac{y^2}{64} = 1}$$

37) $$\frac{x^2}{16} - \frac{y^2}{49} = 1$$

$a = 4$
$b = 7$

$c^2 = a^2 + b^2$
$c^2 = 16 + 49$
$c^2 = 65$
$c = \pm\sqrt{65}$



38) $$\frac{x^2}{36} - \frac{y^2}{16} = 1$$

$a = 6$
$b = 4$
center $(0,0)$