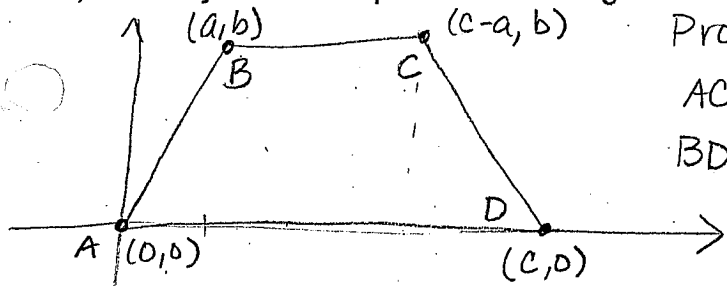


Analysis

Chapter 6 Review

name KEY

1) Prove by coordinate proof that the lengths of the diagonals of an isosceles trapezoid are congruent.



Prove $AC = BD$

$$AC = \sqrt{(c-a-0)^2 + (b-0)^2} = \sqrt{(c-a)^2 + b^2}$$

$$BD = \sqrt{(c-a)^2 + (0-b)^2} = \sqrt{(c-a)^2 + b^2}$$

Since $AC = BD$, diagonals are congruent.

2) Find the center and radius of the circle $2x^2 + 2y^2 - 5x + y = 0$

$$2x^2 - 5x + 2y^2 + y = 0$$

$$2(x^2 - \frac{5}{2}x + \frac{25}{16}) + 2(y^2 + \frac{1}{2}y + \frac{1}{16}) = 0 + \frac{25}{8} + \frac{1}{8} = \frac{26}{8}$$

$$2(x - \frac{5}{4})^2 + 2(y + \frac{1}{4})^2 = \frac{26}{8}$$

$$(x - \frac{5}{4})^2 + (y + \frac{1}{4})^2 = \frac{13}{8}$$

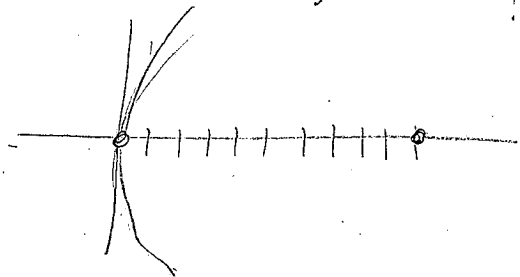
center: $(\frac{5}{4}, -\frac{1}{4})$
radius: $\frac{\sqrt{26}}{4}$

3) Find the coordinates of A and B on the horizontal diameter AB if the circle is $x^2 + y^2 - 20x = 0$

$$x^2 - 20x + 100 + y^2 = 0 + 100$$

$$(x-10)^2 + y^2 = 100$$

(0,0) (20,0)



4) Find the center and foci of the ellipse $9(x-3)^2 + 4(y+5)^2 = 36$

center: (3, -5) $\frac{(x-3)^2}{4} + \frac{(y+5)^2}{9} = 1$

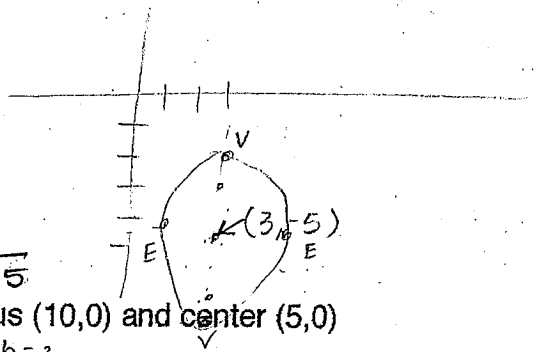
foci: $(3, -5 + \sqrt{5})$
 $(3, -5 - \sqrt{5})$

$$b^2 = a^2 - c^2$$

$$4 = 9 - c^2$$

$$-5 = -c^2$$

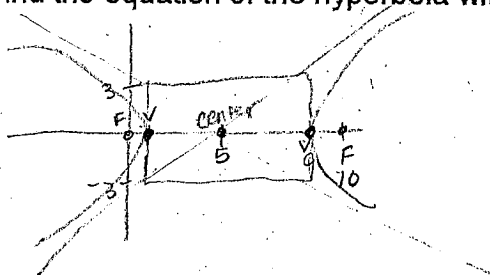
$$c^2 = 5 \quad c = \sqrt{5}$$



5) Find the equation of the hyperbola with vertex at (9,0) and focus (10,0) and center (5,0)

$$a=4 \quad c=5 \quad b=3$$

$$\frac{(x-5)^2}{16} - \frac{y^2}{9} = 1$$

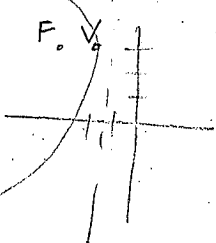


6) Find the vertex, focus, directrix and x and y intercepts for the parabola $x+2 = -2(y-3)^2$

vertex = (-2, 3)

focus = $(-2\frac{1}{8}, 3)$

directrix: $x = -1\frac{7}{8}$



$$x = -\frac{1}{4p} y^2$$

$$x = -y^2$$

$$-\frac{1}{4p} = -\frac{2}{1}$$

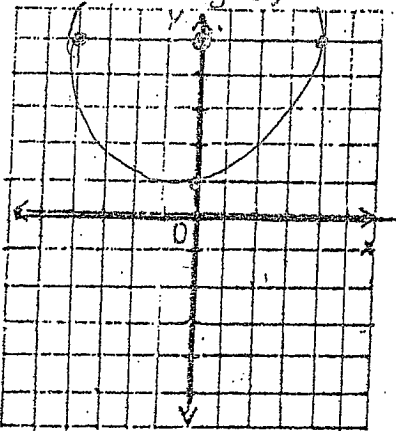
$$-8p = -1$$

$$p = \frac{1}{8}$$

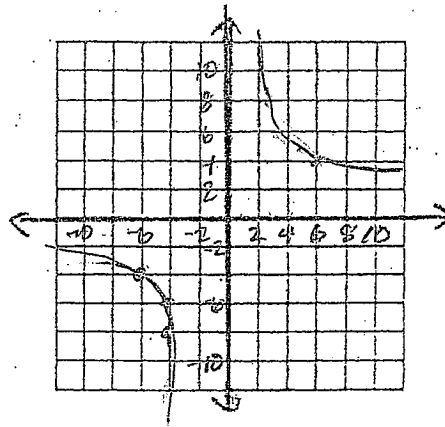
$$x^2 = 16 - (y-5)^2$$

7) graph $x = \sqrt{16 - (y-5)^2}$
 $x^2 + (y-5)^2 = 16$

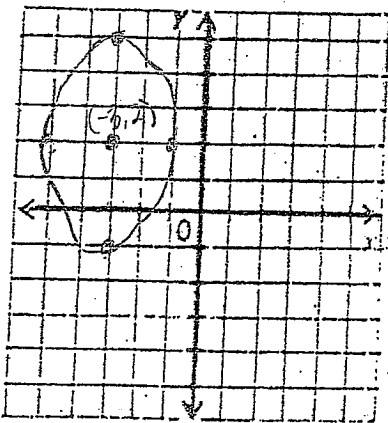
circle
 center (0,5)
 radius 4



8) graph $xy = 24$



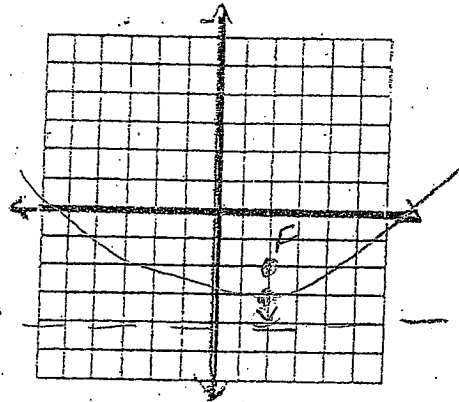
9) graph $\frac{(x+3)^2}{4} + \frac{(y-2)^2}{9} = 1$



10) graph $y+3 = \frac{1}{4}(x-2)^2$

$$\frac{1}{4p} = \frac{1}{4}$$

$$p = 1$$



11) Solve the system algebraically and graphically.

$$9x^2 - 16y^2 = 144 \quad x + y^2 = -4$$

$$\frac{x^2}{16} - \frac{y^2}{9} = 1$$

$$y^2 = -x - 4 \quad y = \pm \sqrt{-x-4}$$

$$9x^2 - 16(-x-4) = 144$$

$$9x^2 + 16x + 64 - 144 = 0$$

$$9x^2 + 16x - 80 = 0$$

$$(9x-20)(x+4) = 0$$

$$9x = 20$$

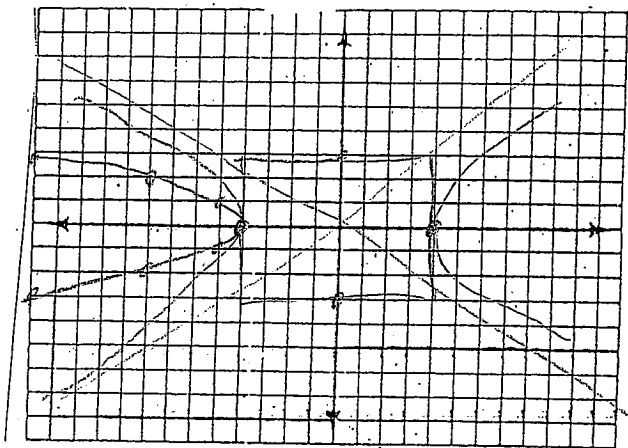
$$x = \frac{20}{9}$$

$$\boxed{x = -4}$$

$$\boxed{y = 0}$$

$$y^2 = \frac{-20}{9} - \frac{36}{9}$$

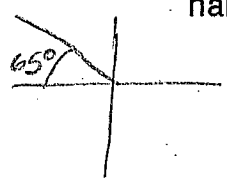
$$y^2 = \frac{-56}{9}$$



Analysis

Trimester II Review

name KEY



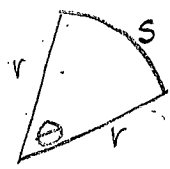
1) Find two angles that are coterminal with 115°

$-245^\circ; 475^\circ$

2) Find 115° in radians. $\frac{115^\circ}{1} \cdot \frac{\pi}{180} = 2.007$

3) A sector has a perimeter of 7 cm. and area of 3 square cm. What is the radius?

$2r+3=7$
 $2r=4$
 $r=2$



$2r+4=7$
 $2r=3$
 $r=1.5$

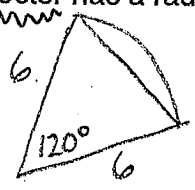
$P = 2r + s = 7$
 $S = 7 - 2r$
 $S = 7 - 2(\frac{6}{5})$
 $S = 7 - \frac{12}{5}$

$K = \frac{1}{2}r^2\theta = 3$
 $r^2\theta = 6$
 $r^2(\frac{s}{r}) = 6$

$\frac{1}{2}rs = K$ $rs = b$
 $\frac{1}{2}rs = 3$
 $\theta = \frac{s}{r}$ $S = \theta r$
 ~~$S^2 = 7S - 12$
 $S^2 - 7S + 12 = 0$
 $(S-4)(S-3) = 0$
 $S = 4, S = 3$~~

4) If a sector has a radius of 6 and central angle of 120 degrees, find the area of its segment.

$\frac{2}{180}$
 $\frac{120}{180}$



$\frac{1}{2}(\frac{2\pi}{3})(36) - \frac{1}{2}(36)(\sin \frac{2\pi}{3})$
 $12\pi - 15.588 = 22.11$
 $9\sqrt{3}$

5) Find in fraction form.

A) $\sin \frac{5\pi}{6}$
 $\frac{1}{2}$

B) $\csc \frac{5\pi}{4}$
 $\frac{1}{\sin \frac{5\pi}{4}} = \frac{1}{-\frac{\sqrt{2}}{2}}$
 $= -\sqrt{2}$

C) $\tan \frac{5\pi}{3}$
 $\frac{\sin \frac{5\pi}{3}}{\cos \frac{5\pi}{3}} = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}}$
 $= -\sqrt{3}$

D) $\sec 210^\circ$
 $\frac{1}{\cos 210^\circ} = \frac{1}{-\frac{\sqrt{3}}{2}}$
 $= -\frac{2\sqrt{3}}{\sqrt{3}\sqrt{3}}$
 $= -\frac{2\sqrt{3}}{3}$

E) $\cot \frac{-5\pi}{4}$
 $\frac{\cos \frac{-5\pi}{4}}{\sin \frac{-5\pi}{4}} = \frac{-\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}} = 1$

6) Find in decimal form

A) $\cos \frac{3\pi}{5}$
 $= .30902$

B) $\cot 5$
 $= -.29581$

C) $\sec 100^\circ$
 $= -5.75877$

D) $\csc -200^\circ$
 $= 2.92380$

7) Solve for x in degrees ($0 < x < 360$)

A) $4 \cot x - 5 = 0$

$4 \cot x = 5$
 $\cot x = \frac{5}{4}$
 $\tan x = \frac{4}{5}$
 $x = 38.7^\circ, 218.7^\circ$

B) $\cos x \tan x = \cos x$

$\cos x \tan x - \cos x = 0$
 $\cos x (\tan x - 1) = 0$
 $\cos x = 0$ $\tan x = 1$
 $x = 90^\circ, 270^\circ$ $x = 45^\circ, 225^\circ$

C) $2 \cos 2x = -1$

$\cos 2x = -\frac{1}{2}$
 $2x = 120^\circ, 240^\circ$
 $480^\circ, 600^\circ$
 $x = 60^\circ, 120^\circ,$
 $240^\circ, 300^\circ$

D) $2 \sin x \cos x = 1$

$\sin 2x = 1$
 $2x = 90^\circ, 450^\circ$
 $x = 45^\circ, 225^\circ$

8) Solve for x in radians ($0 < x < 2\pi$)

A) $\cos(x - 45^\circ) = \frac{\sqrt{3}}{2}$

$$x - \frac{\pi}{4} = \frac{\pi}{6} \quad \frac{11\pi}{6}$$

$$x = \frac{5\pi}{12}, \quad \frac{25\pi}{12}$$

9) Simplify

A) $\frac{\sec x}{\cos x} - \frac{\tan x}{\cot x}$

$$\frac{\frac{1}{\cos x}}{\cos x} - \frac{\frac{\sin x}{\cos x}}{\frac{\cos x}{\sin x}} = \frac{1}{\cos x} \cdot \frac{1}{\cos x} - \frac{\sin x}{\cos x} \cdot \frac{\sin x}{\cos x}$$

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

C) $(\sec x + \tan x)(1 - \sin x)$

$$\left(\frac{1}{\cos x} + \frac{\sin x}{\cos x}\right)(1 - \sin x)$$

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

$$= \frac{\cos^2 x}{\cos x} = \cos x$$

E) $\sqrt{\frac{1 - \cos 80^\circ}{2}} = \sin 40^\circ$

B) $\sin^2 x - \sin x = \cos^2 x$

$$\sin^2 x - \sin x - \cos^2 x = 0$$

$$\sin^2 x - \sin x - (1 - \sin^2 x) = 0$$

$$\sin^2 x - \sin x - 1 + \sin^2 x = 0$$

$$2\sin^2 x - \sin x - 1 = 0$$

$$(2\sin x + 1)(\sin x - 1) = 0$$

$$2\sin x = -1 \quad \sin x = 1$$

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

$$x = \pi/2$$

$$x = 7\pi/6, \quad \frac{11\pi}{6}$$

$$90^\circ$$

B) $\cos^4 x - \sin^4 x$

$$(\cos^2 x + \sin^2 x)(\cos^2 x - \sin^2 x)$$

$$(1 - \sin^2 x - \sin^2 x) =$$

$$1 - 2\sin^2 x = \cos 2x$$

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

$$= + \frac{\cos x}{\sin x}$$

$$= + \cot x$$

F) $\frac{\sec^2 x}{(1 + \tan^2 x)(1 - \cos 2x)} \cdot \frac{1}{\cos^2 x} \left(\frac{1 - (1 - 2\sin^2 x)}{1}\right) =$

$$\frac{\cos^2 x + \sin^2 x}{\cos^2 x} \cdot \frac{2 \tan^2 x}{2}$$

$$\left(\frac{1}{\cos^2 x}\right) \left(\frac{1 - (2\cos^2 x - 1)}{2}\right) = \frac{2 - 2\cos^2 x}{2 \cos^2 x} \cdot \frac{1}{2}$$

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

G) $\sin(30^\circ + x) + \sin(30^\circ - x)$

$$\sin 30^\circ \cos x + \cos 30^\circ \sin x + \sin 30^\circ \cos x - \cos 30^\circ \sin x$$

$$\frac{1}{2} \cos x + \frac{\sqrt{3}}{2} \sin x + \frac{1}{2} \cos x - \frac{\sqrt{3}}{2} \sin x =$$

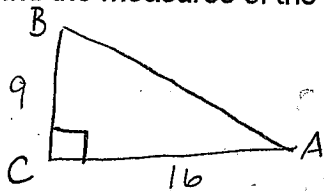
$$1 \cos x$$

H) $\frac{\tan \frac{4\pi}{3} - \tan \frac{\pi}{12}}{1 + \tan \frac{4\pi}{3} \tan \frac{\pi}{12}} = \tan\left(\frac{4\pi}{3} - \frac{\pi}{12}\right)$

$$= \tan\left(\frac{15\pi}{12}\right) = \tan \frac{5\pi}{4}$$

$$= 1$$

10) Find the measures of the acute angles of a right triangle with legs of 9 and 16 cm.

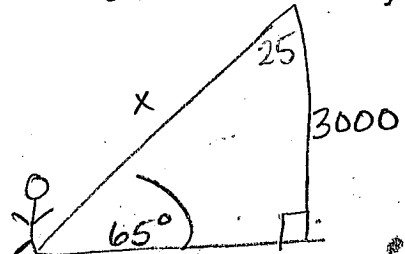


$$\tan A = 9/16$$

$$A = 29.4^\circ$$

$$B = 60.6^\circ$$

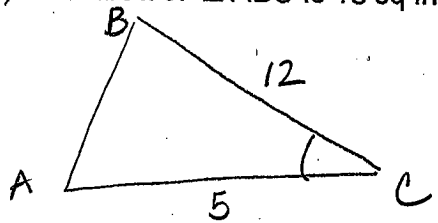
11) As you look up at a plane in the sky the angle of elevation is 65 degrees. If you know the plane is 3,000 feet high, how far is it from you to the plane?



$$\sin 65^\circ = \frac{3000'}{x}$$

$$x = 3310.13'$$

12) The area of ΔABC is 15 sq inches. If $a=12$ inches and $b=5$ inches find $\angle C$ in degrees.

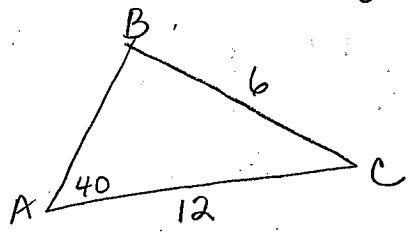


$$\frac{1}{2}(5)(12)(\sin C) = 15$$

$$\sin C = \frac{1}{2}$$

$$C = 30^\circ, 150^\circ$$

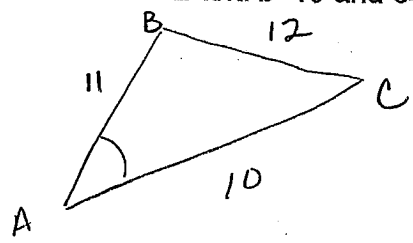
13) In ΔABC if $\angle A = 40$ degrees and $a=6$ find $\angle B$ if $b=12$



$$\frac{\sin 40^\circ}{6} = \frac{\sin B}{12}$$

$$B = \text{not possible}$$

14) In ΔABC if $a=12$ and $b=10$ and $c=11$ find the measure of the largest angle.



$$12^2 = 11^2 + 10^2 - 2(10)(11)(\cos A)$$

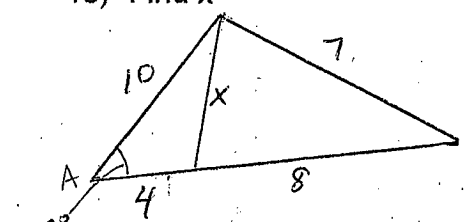
$$144 = 121 + 100 - 220 \cos A$$

$$-77 = -220 \cos A$$

$$\cos A = .35$$

$$A = 69.5^\circ$$

15) Find x



$$7^2 = 10^2 + 4^2 - 2(10)(4)(\cos 35.7^\circ)$$

$$49 = 100 + 16 - 240 \cos A$$

$$-195 = -240 \cos A$$

$$.7708 = \cos A$$

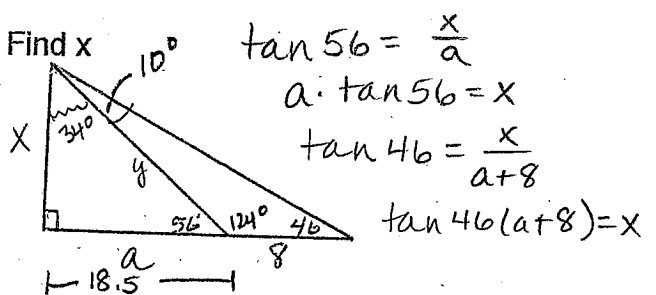
$$A = 35.7^\circ$$

16) Find x

$$x^2 = 10^2 + 4^2 - 2(10)(4)(\cos 35.7^\circ)$$

$$x^2 = 51.033$$

$$x = 7.14$$



$$\tan 56 = \frac{x}{a}$$

$$a \cdot \tan 56 = x$$

$$\tan 46 = \frac{x}{a+8}$$

$$\tan 46(a+8) = x$$

$$1.48256a = 1.03553a + 8.28424$$

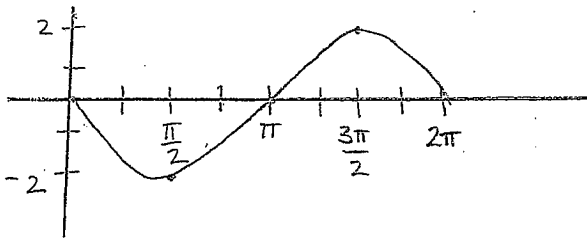
$$.44703a = 8.28424$$

$$a = 18.5$$

$$x = 27.5$$

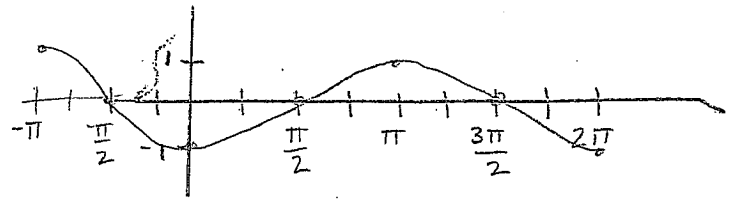
17) Graph below each function for $0 \leq x < 2\pi$

A) $y = -2 \sin x$

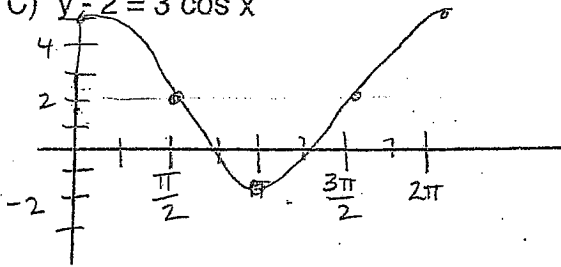


$$y = -3 \cos 2x + 4$$

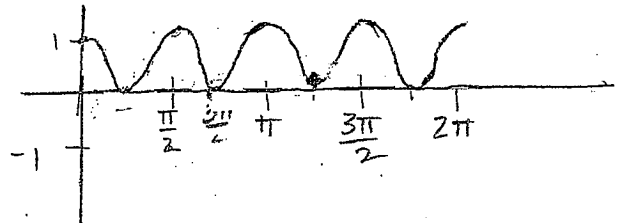
B) $y = \cos(x + \pi)$



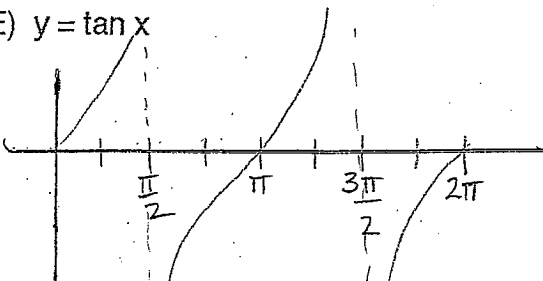
C) $y - 2 = 3 \cos x$



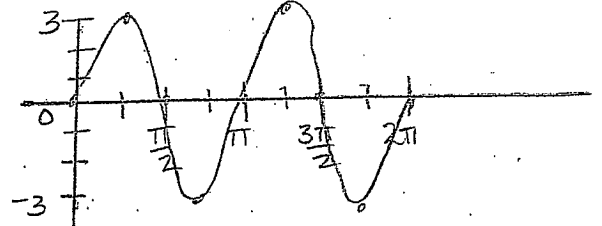
D) $y = |\cos 2x|$



E) $y = \tan x$



F) $y = 3 \sin 2x$



18) Find the equation for a circle with center $(-3, 4)$ and radius 9

$$(x+3)^2 + (y-4)^2 = 81$$

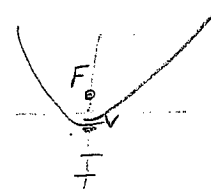
19) Find the vertex, focus and directrix for the parabola $y = \frac{1}{8}x^2 - 1$

vertex: $(0, -1)$

focus: $(0, 1)$

directrix: $y = -3$

$$\frac{1}{8} = \frac{1}{4p} \quad p = 2$$



20) Find the center and foci of the ellipse $x^2 + 25y^2 - 6x - 100y + 84 = 0$

$$(x^2 - 6x + 9) + 25(y^2 - 4y + 4) = -8.4 + 9 + 100$$

$$\frac{(x-3)^2}{25a^2} + \frac{(y-2)^2}{1b^2} = 1$$

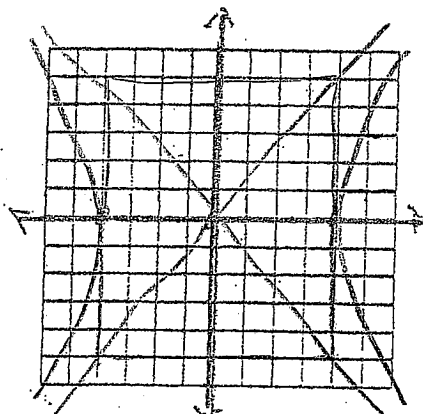
$$1 = 25 - c^2 \quad c^2 = 24 \quad c = 2\sqrt{6}$$

center: $(3, 2)$

foci: $(3+2\sqrt{6}, 2), (3-2\sqrt{6}, 2)$

21) Graph $25x^2 - 16y^2 = 400$

$$\frac{x^2}{16} - \frac{y^2}{25} = 1$$



22) Graph $x^2 + y^2 - 2x - 8y + 16 = 0$

$$x^2 - 2x + 1$$

$$y^2 - 8y + 16 = -16 + 16$$

$$(x-1)^2 + (y-4)^2 = 1$$

