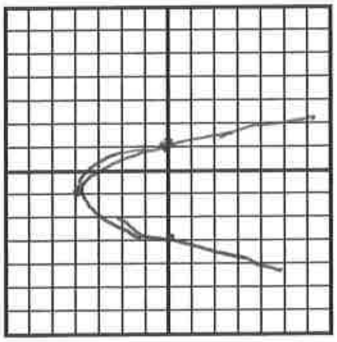
Name Key

1. Find the vertex and graph of the equation: $x = y^2 + 2y - 3$ −horiz, pos (face right

Vertex −4, −1



$x = y^2 + 2y + 1 - 1 - 3$

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

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

$(-4, -1)$

Another pt: let $y = 1$

$x = 1^2 + 2 - 3 = 0$

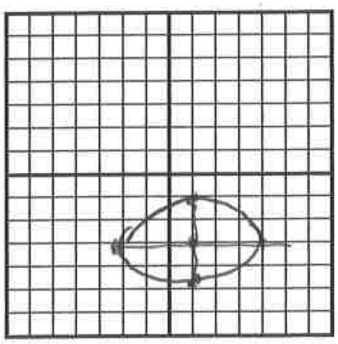
2. Find the center and graph of $\frac{(x-1)^2}{9} + \frac{(y+3)^2}{4} = 1.$

$a = 3 \quad b = 2$

$(1, -3)$

ellipse (pos x^2, pos y^2

Center (1, -3)

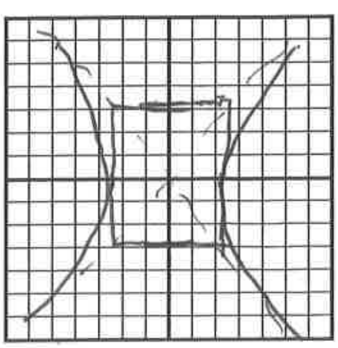


horzontal hyperbola (pos x^2, neg y^2)

3. Find the center and graph of $9x^2 - 5y^2 = 45.$

$\frac{9x^2}{45} - \frac{5y^2}{45} = \frac{45}{45}$

Center (0,0)



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

$a = \sqrt{5} \quad b = 3$

4. Find the standard form equation of the circle with center at (0, 2), passing through the point (4, -1).

(h, k)

$(x-h)^2+(y-k)^2=r^2$

r = distance between 2 pts

$= \sqrt{(4-0)^2+(-1-2)^2} = \sqrt{16+9} = \sqrt{25} = 5$

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

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

5. Solve the system using elimination or substitution (you may want to graph the system in the problem below first:

① $x^2 + y^2 = 16$ – circle, $r=4$

② $4x^2 + y^2 = 16$ – ellipse

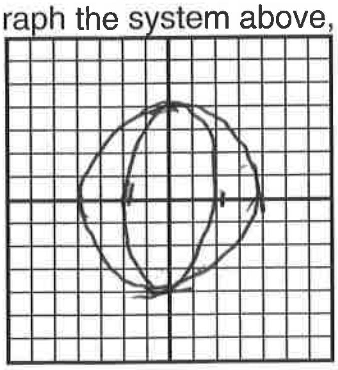
By elim.,
$-x^2-y^2=-16$
$4x^2+y^2=16$

$3x^2=0$; $x=0$

$0^2+y^2=16$; $y=\pm 4$

Solutions:
$(0,4)$, $(0,-4)$

6. Graph the system above, showing point(s) of intersection.



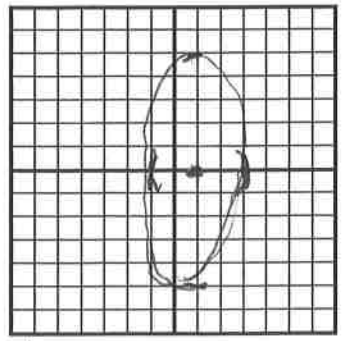
① $x^2+y^2=16 \Rightarrow$ circle, $r=4$, $C=(0,0)$

② $\frac{4x^2}{16}+\frac{y^2}{16}=\frac{16}{16}$ ellipse & $C=(0,0)$

$\frac{x^2}{4}+\frac{y^2}{16}=1$

$a=2$ $b=4$

7. Find the standard form equation of the ellipse with vertices at (1, ±5) and semivertices (end pts. of minor axis) at (-1, 0), and (3, 0). Graphing is not required, but may be helpful.



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

Center $x=1, y=0$ $(1,0)$

$a=2$ units, $b=5$ units

$\frac{(x-1)^2}{2^2}+\frac{(y-0)^2}{5^2}=1$; $\frac{(x-1)^2}{4}+\frac{y^2}{25}=1$

8. Find the 50^{th} term of the sequence: -11, -7, -3, 1, ...

arithmetic

$d=4$ $(d=-7-(-11)=4)$

$a_n=a_1+(n-1)d$

$a_{50}=-11+(50-1)(4)$

$a_{50}=-11+196=185$

9. Find the 12^{th} term of the sequence $\frac{1}{32}-\frac{1}{16}+\frac{1}{8}-\frac{1}{4}$......

geometric

$r=-2$; $r=\frac{-1/16}{1/32}=-\frac{1}{16}\cdot\frac{32}{1}=-2$

$a_n=a_1r^{n-1}=\frac{1}{32}(-2)^{11}=-\frac{2^{11}}{2^5}=-2^6$

$=-64$

arithmetic

10. Find the sum of the sequence: -5, -3, -1, 1, ... 53 (hint: what is n?)

$+2$ $+2$

$a_1=-5$ $a_n=53$

$S_n=\frac{n}{2}(a_1+a_n)$

To get n; use $a_n=a_1+(n-1)d$

$53=-5+(n-1)(2)$

$53=-5+2n-2$; $50=2n$, $n=25$

$S_{25}=\frac{25}{2}(-5+53)=600$

11. Find the sum of the infinite geometric sequence $5-\frac{5}{3}+\frac{5}{9}+\ldots\ldots$

$S_\infty = \frac{a_1}{1-r}$ $\quad a_1, \; r = -\frac{1}{3} \quad \left(r = \frac{-\frac{5}{3}}{\frac{5}{1}} = \frac{-5}{3} \cdot \frac{1}{5} = -\frac{1}{3}\right)$

$= \frac{5}{1-(-\frac{1}{3})} = \frac{5}{1+\frac{1}{3}} = \frac{5}{\frac{4}{3}} = 5 \cdot \frac{3}{4} = \frac{15}{4}$ or $3\frac{3}{4}$

12. Change the repeating decimal $.\overline{79}$ to a fraction in lowest terms.

$= S$

$100S = 79.79\overline{79}$

$1S = .79\overline{79}$

$99S = 79$

$S = 79/99$

or

$S = .79 + .0079 + .000079 + \ldots$

$= .79 + .01(.79) + (.01)^2(.79)$

$= \frac{.79}{(1-.01)} = \frac{.79}{.99} = \frac{79}{99}$

13. Expand and write in polynomial form: $(x - 2)^5$

$(x-2)^5 = 1 \cdot x^5 + 5x^4(-2) + 10x^3(-2)^2 + 10x^2(-2)^3 + 5x(-2)^4 + 1(-2)^5$

$\qquad (-2)^2 = 4, \; (-2)^3 = -8, \; (-2)^4 = 16, \; (-2)^5 = -32$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

$= x^5 - 10x^4 + 40x^3 - 80x^2 + 80x - 32$

14. An auditorium has 42 seats in the first row, and there are 25 rows. If each row has 2 more seats than the previous row:

a) How many seats are there in the last row? $\quad a_1 = 42, \; n = 25, \; d = 2$

$a_{25} = 42 + (25-1)2 = 42 + 48 = 90$ seats

b) How many seats total are in the auditorium?

$S_{25} = \frac{25}{2}(42+90) = \frac{25}{2}(132) = 25(66) = 1650$ seats