

Math 1210-3

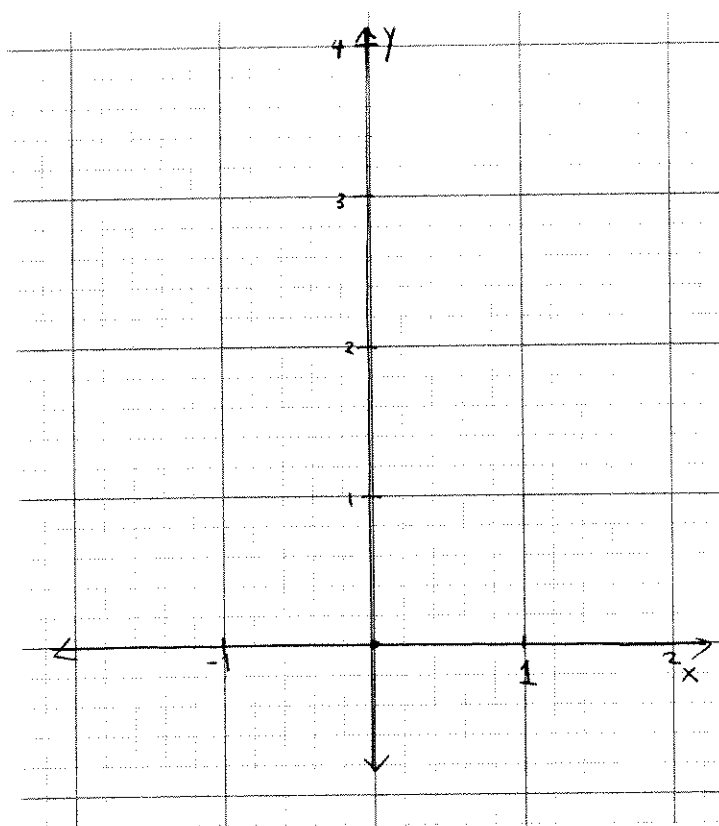
Fri Jan 18

0.4: Graphs of equations, and how to translate, stretch, and reflect them

Definition A The graph of an equation (with variables x, y) is the set of all points (x, y) for which the equation is true. (A sketch of the graph is a picture which shows the graph)

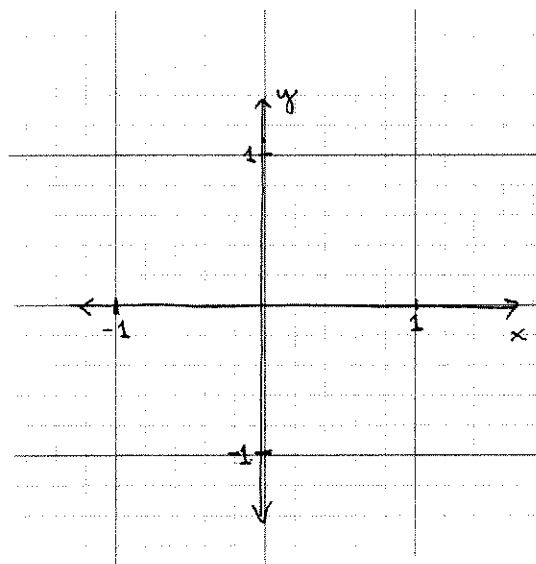
Exercise 1 Fill in the table below and use it to sketch the graph of $y = x^2$, for $|x| \leq 2$

x	x^2
0	
1	
-1	
± 2	
± 2	
± 4	
± 6	
± 8	
± 1.5	



Exercise 2 : Find points on the graph of $x^2 + y^2 = 1$ and then use the Pythagorean Theorem to sketch the graph.

x	y



Exercise 3 Moving points in the plane

A point (a, b) is plotted ($a > 0, b < 0$, in this case)

Numbers h, k are indicated ($h > 0, k > 0$ in this case)

Plot the following points, describe geometrically.

(i) $(-a, b)$

(ii) $(a, -b)$

(iii) $(-a, -b)$

(iv) (b, a)

(v) $(a+h, b)$

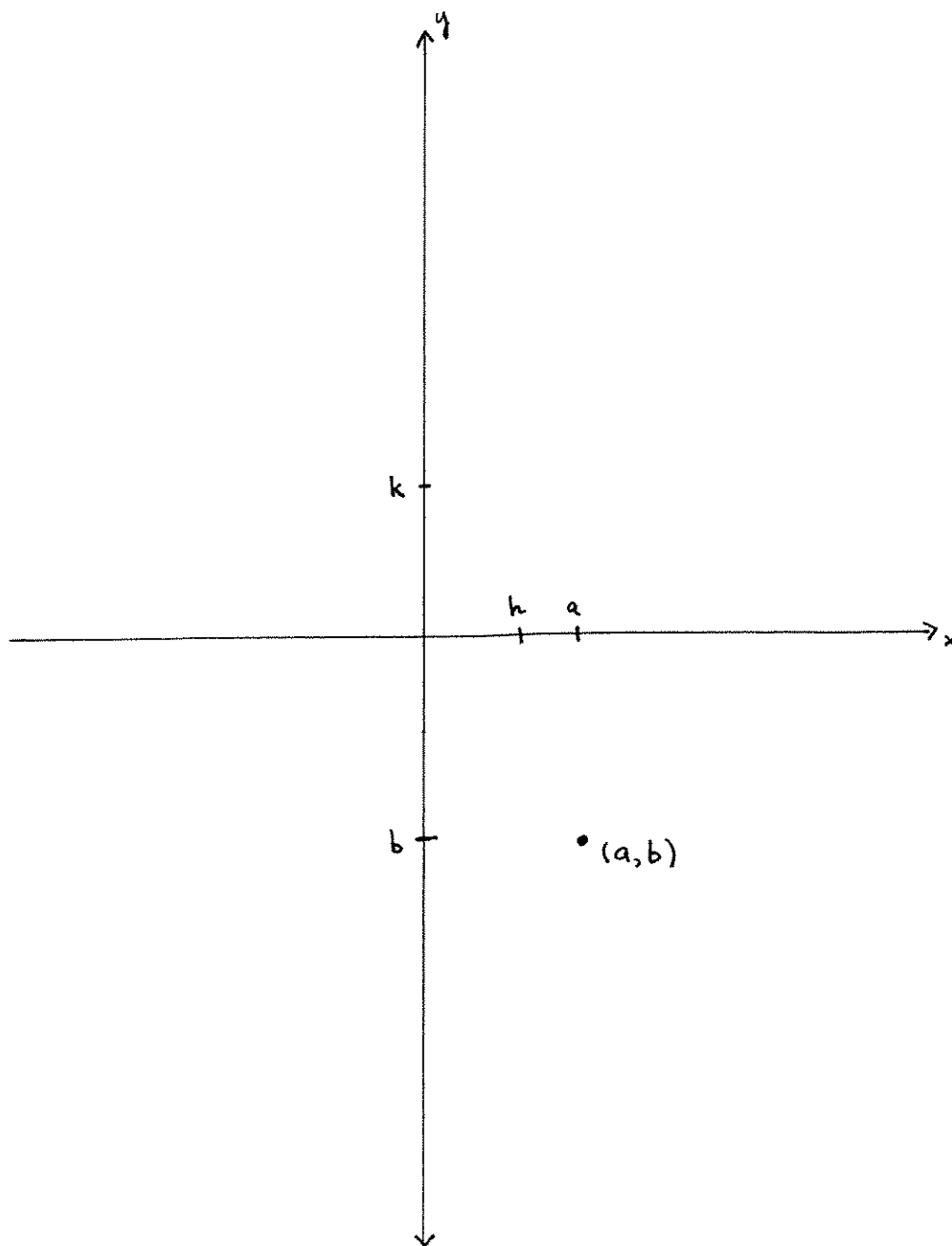
(vi) $(a, b+k)$

(vii) $(a+h, b+k)$

(viii) $(2a, 2b)$

(ix) $(2a, 3b)$

(x) $(\frac{1}{3}a, \frac{1}{3}b)$

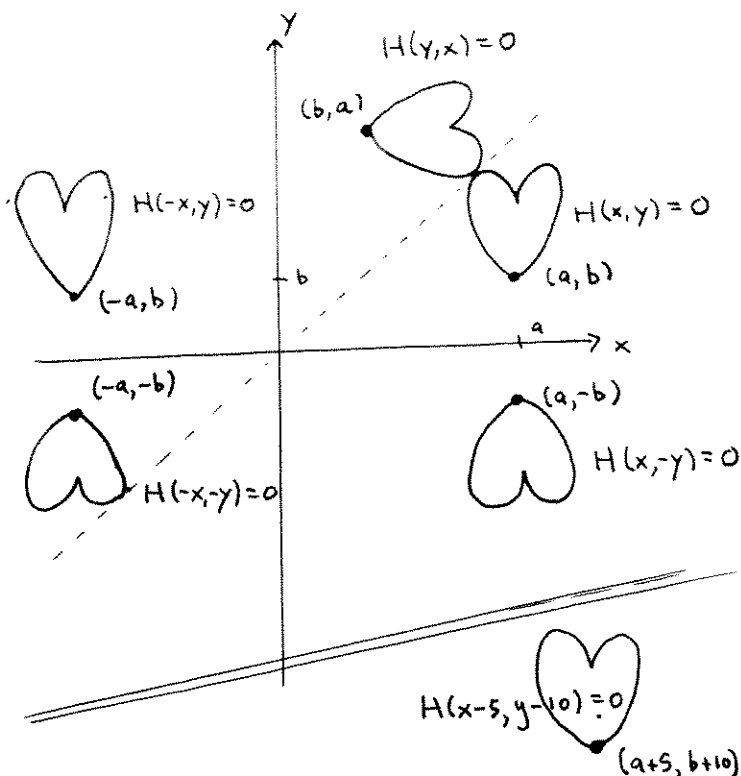


Reflecting graphs

A sketch of the graph $F(x,y) = G(x,y)$
(or, $H(x,y) = 0$)

is shown.

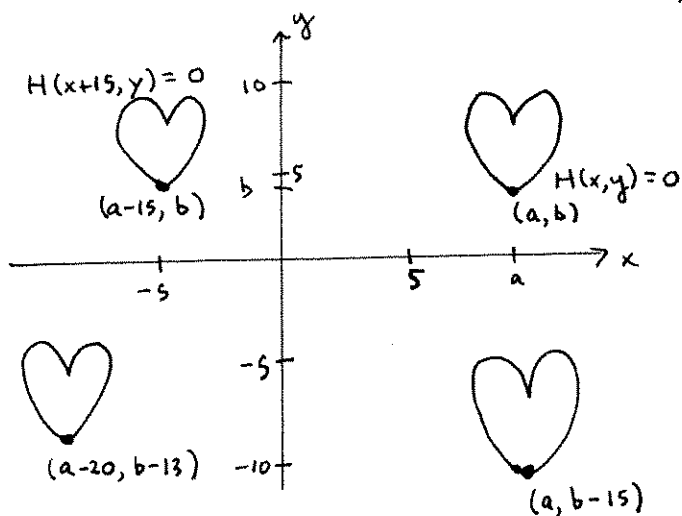
Exercise 4 Explain why the related equations have the particular reflected graphs.



Translating graphs

Exercise 5 Explain why the related equations have the particular translated graphs.

Notice: the truth seems "reversed".



Equation:

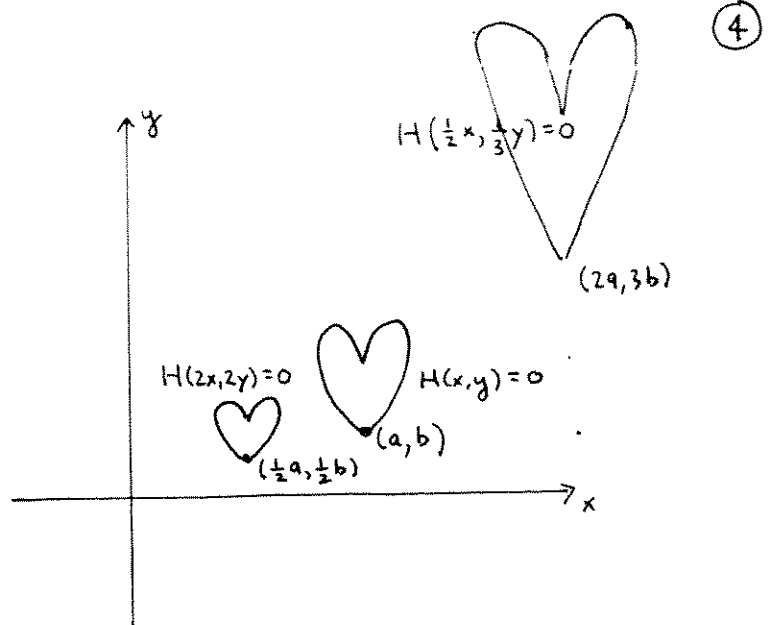
- If you replace x with $x-h$
" " y with $y-k$

the graph moves h units to the right
and k units up!!

stretching graphs

Exercise 6 : Explain why the related equations have the indicated graphs counterintuitive!

• If you replace x with cx
 y with dy
 the graph is stretched
 by $\frac{1}{c}$ in x -dir
 $\frac{1}{d}$ in y -dir!



Exercise 7 Sketch the graphs of (parts of)

(i) $y = -x^2$

(ii) $x = y^2$

(iii) $y = x^2 + 2$

(iv) $y = (x+2)^2$

(v) $(x-3)^2 + (y+2)^2 = 1$

(vi) $\left(\frac{x}{3}\right)^2 + \left(\frac{y}{2}\right)^2 = 1$

