Review of second degree and Homographic functions
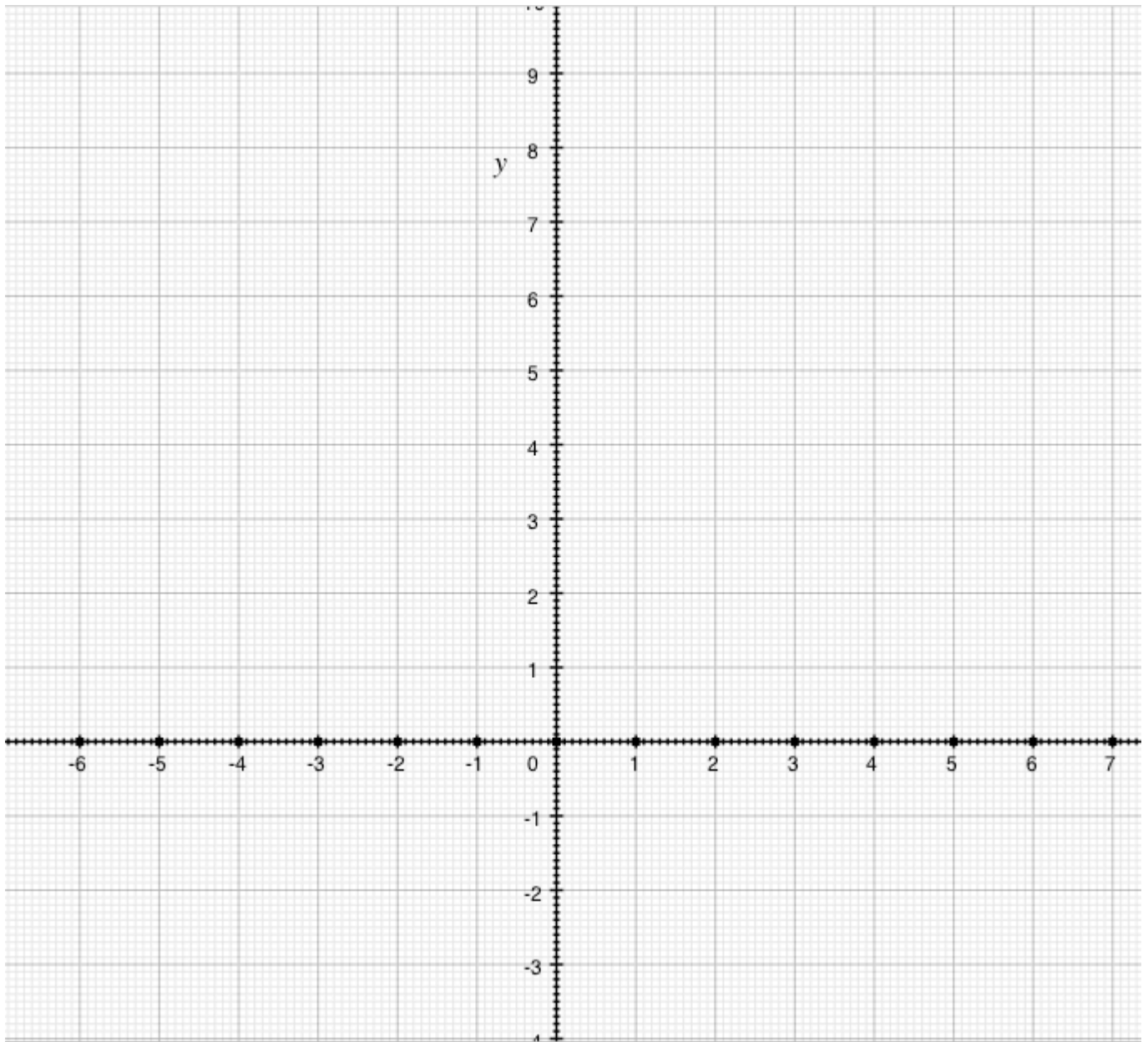References : Memos available on the class website

I . 1. Draw the Hyperbola and the two lines defined by the following equations :

$$\text{(1)} \quad y = \frac{3x-10}{x-2} \quad ; \quad \text{(2)} \quad y = x+5 \quad ; \quad \text{(3)} \quad y = 2x+5$$

I.2. Find the coordinates of the intersection points of the 2 lines with the Hyperbola.

(Show the calculations below)

I.3. Let m be any real number. We consider the straight line (D_m) defined by the equation

$$y = mx + 5$$

a) Show that (D_m) turns around a fixed point A while m varies from $-\infty$ to $+\infty$.

b) Find for which values of m the line (D_m) cuts the Hyperbola in 2 points
(write the proof below).

c) Explain why the line (D_1) is tangent to the Hyperbola in A(0;5).