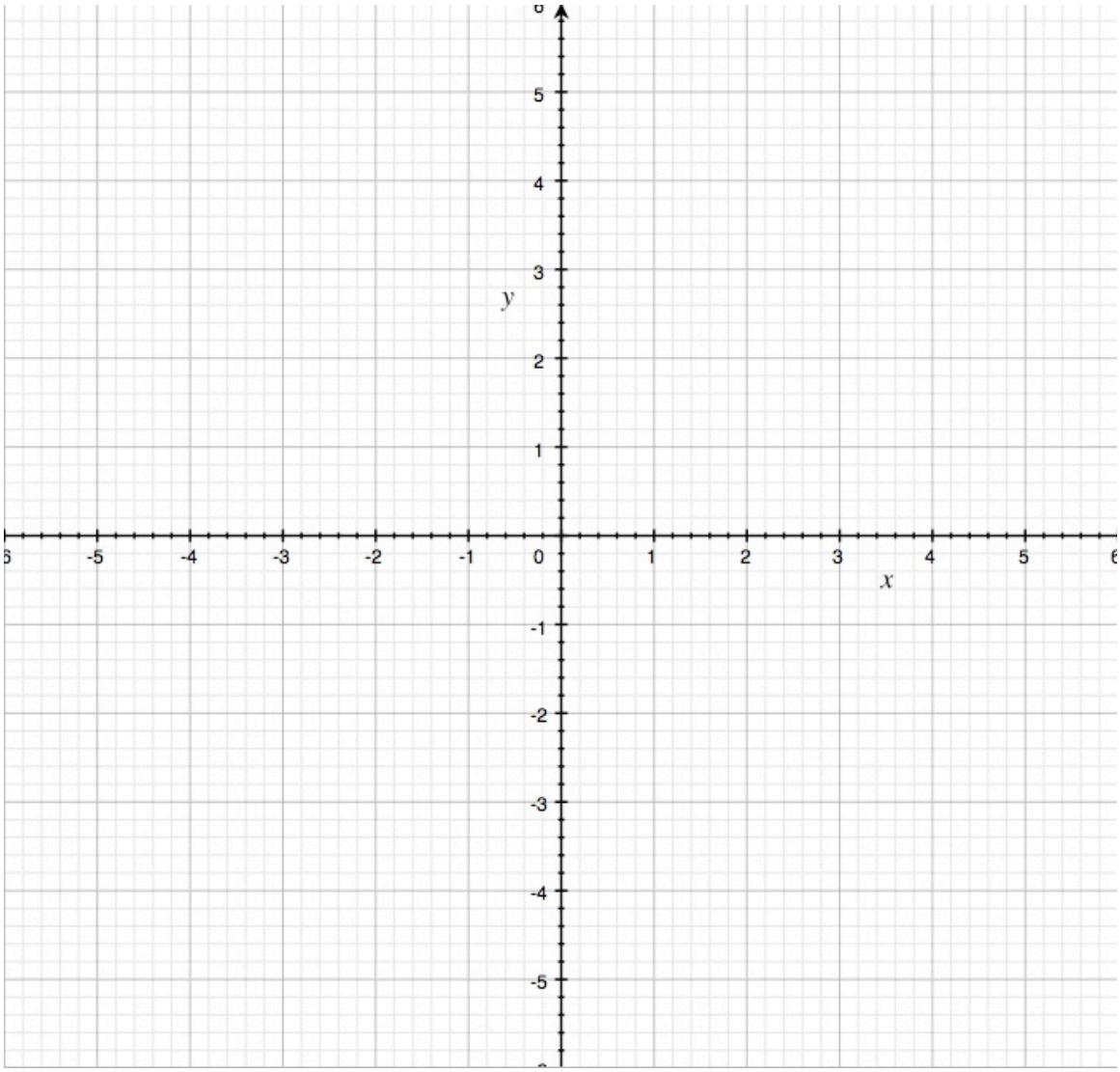
I.1. Carefully draw the Parabolas of the following equations $y = ax^2$. Please use different colors. Take care of the symmetry and place A$(1;a)$ and B$(\frac{1}{a}\,;\,\frac{1}{a})$.

- ***(P1)*** $\mathbf{y = \frac{1}{4}x^2}$
- ***(P2)*** $\mathbf{y = 4x^2}$
- ***(P3)*** $\mathbf{y = \frac{1}{2}x^2}$
- ***(P4)*** $\mathbf{y = 2x^2}$
- ***(P5)*** $\mathbf{y = -2x^2}$
- ***(P6)*** $\mathbf{y = -4x^2}$



II – *Let (P) be the parabola defined by :* $y = \frac{1}{2}(x-3)^2 - 2$

a) *Vertex coordinates:* $x =$ $y =$

b) *Equation of the axis of symmetry :* $x =$

c) *Intersection with (Oy) :* $x = 0$ $y =$

d) *Intersections with (Ox) :* $y = 0$ $x =$
(show calculations below)

e) *Draw carefully the Parabola using all the above informations (choose carefully the position of the center of coordinates so that the parabola can be seen clearly)*

II – *Let (P) be the parabola defined by :* $y = -\frac{1}{4}(x+2)^2 + 4$

f) Vertex coordinates: $x =$ $y =$

g) Equation of the axis of symmetry : $x =$

h) Intersection with (Oy) : $x = 0$ $y =$

i) Intersections with (Ox) : $y = 0$ $x =$
(show calculations below)

j) Draw carefully the Parabola using all the above informations (choose carefully the position of the center of coordinates so that the parabola can be seen clearly)

III – *Let (P) be the parabola defined by :* $y = \frac{1}{2}x^2 - 2x - 2$

k) Vertex coordinates: $x =$ $y =$

l) Equation of the axis of symmetry : $x =$

m) Intersection with (Oy) : $x = 0$ $y =$

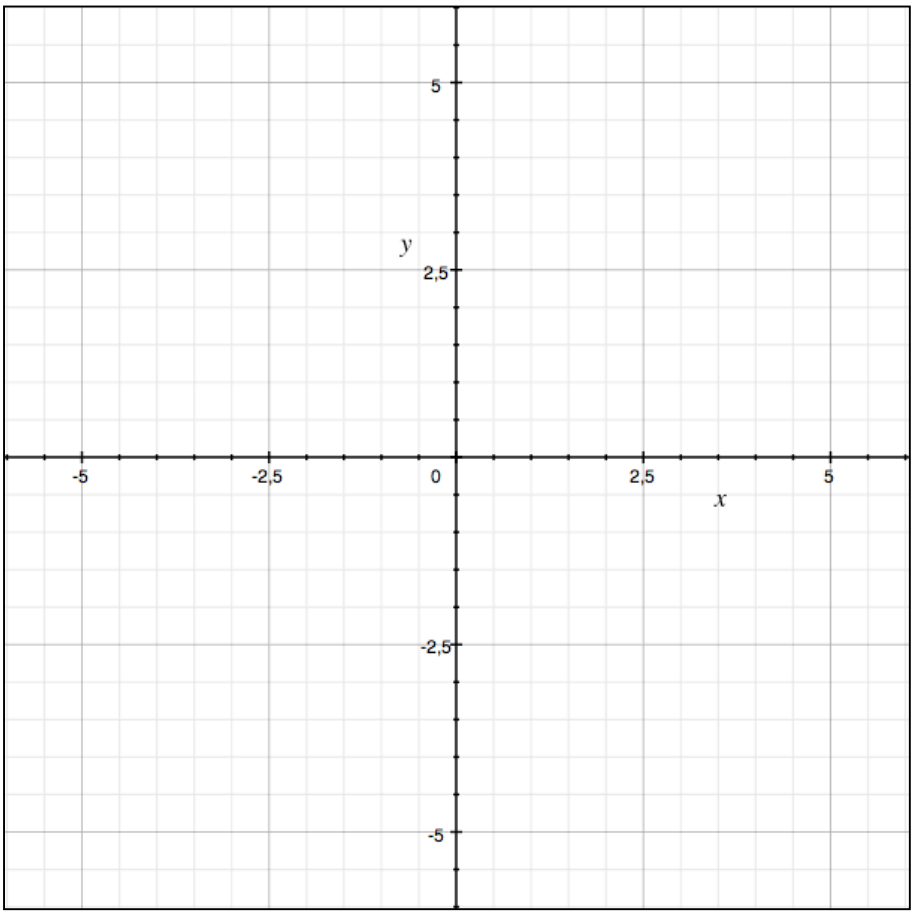
n) Intersections with (Ox) : $y = 0$ $x =$
(show calculations below)

o) Draw carefully the Parabola using all the above informations (choose carefully the position of the center of coordinates so that the parabola can be seen clearly)

V . 1. Draw the parabola and the 2 lines defined by the following equations :

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

V.2. Find the coordinates of the intersection points of the 2 lines with the Parabola.



V.3. Let m be any real number. We consider the Staight line $\mathbf{(D_m)}$ defined by the equation $\boldsymbol{y = mx + 2}$

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

b) Find for which values of m the line $\mathbf{(D_m)}$ cuts the Parabola in 2 points (write the proof).

c) Explain why the line $\mathbf{(D_{1/2})}$ is tangent to the Parabola in A(0;2).