Name:
Group A
Result:

1. [*3 points*]

Solve the following inequalities:

(a) $x^2 - 5x \geqslant 6$

(b) $2x^2 < 3x$

(c) $\dfrac{2x - 1}{x + 1} > 1$

2. [2 *points*]

Let $f(x) = x^2 + 6x + 13$.

(a) Write $f(x)$ in the vertex form.

(b) Hence state the minimum value of $f(x)$.

3. [2 *points*]

Sketch the graph of $y = (3 - x)(x + 1)$. Clearly indicate the axes intercepts and the position of the vertex.

4. [2 *points*]

Given that the equation:

$$x^2 + 3kx + 5k^2 - k = 0$$

has two distinct real solutions, find the possible values of k, where $k \in \mathbb{R}$.

5. [3 *points*]

Solve the simultaneous equations:

$$\begin{cases} y = x^2 - 3x - 2 \\ 5x - y = -7 \end{cases}$$
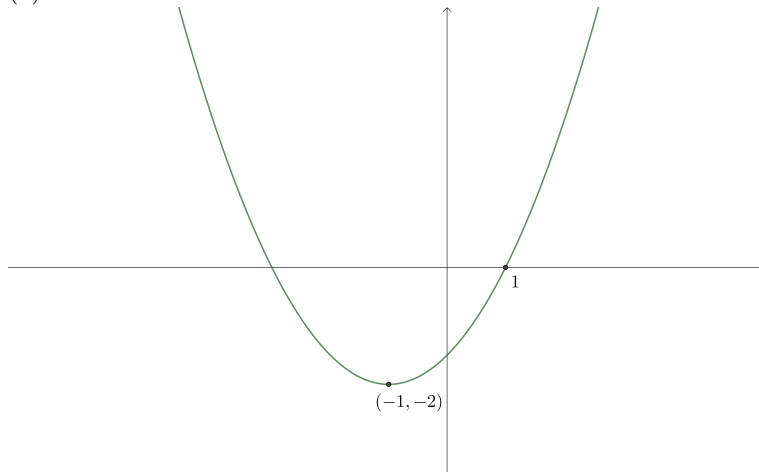
6. [4 *points*]

Find the equation of the quadratic given its graph:
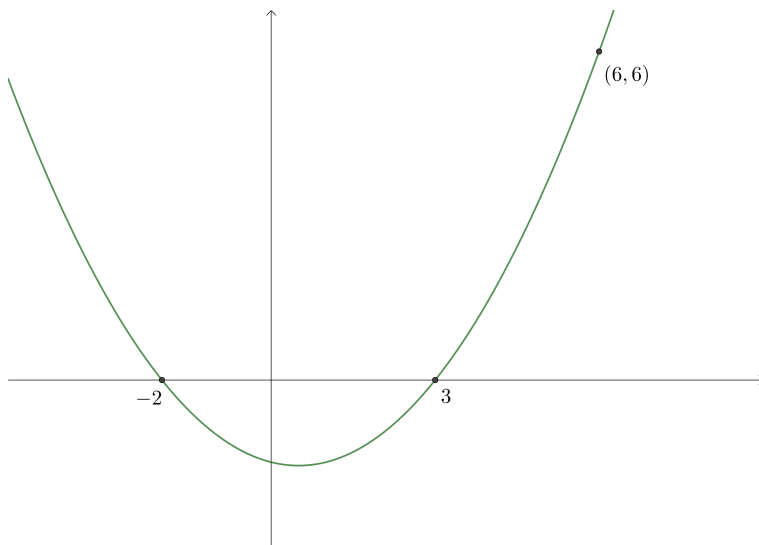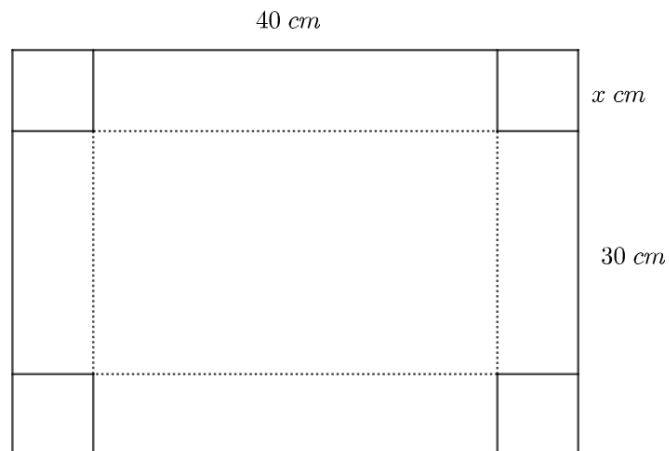
(a)

(b)

7.   [*4 points*]

A rectangular piece of paper has a length of 40 *cm* and a width of 30 *cm*. A square of side length x *cm* has been removed from each corner of the piece . The paper has then been folded along the dotted lines to form an open box.

40 *cm*

x *cm*

30 *cm*

(a) Show that lateral surface area of the outside of the box is given by:

$$A(x) = 140x - 8x^2$$

(b) For what value of x is the lateral surface area maximal? Find this maximal area.