

Please show all work and **box your final answers**. Calculators are not allowed and cellphones should be put away. Good luck!

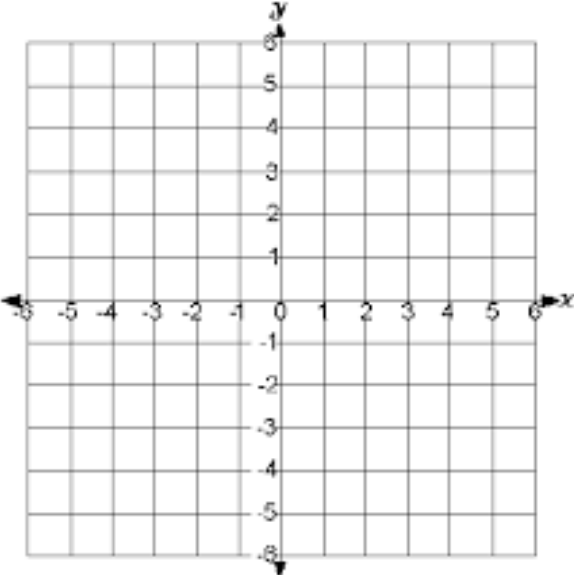
1. Consider the quadratic function $q(x) = 9x^2 - 45x + 13$.

(a) (4 points) Rewrite $q(x)$ in standard form, that is $q(x) = a(x - h)^2 + k$.

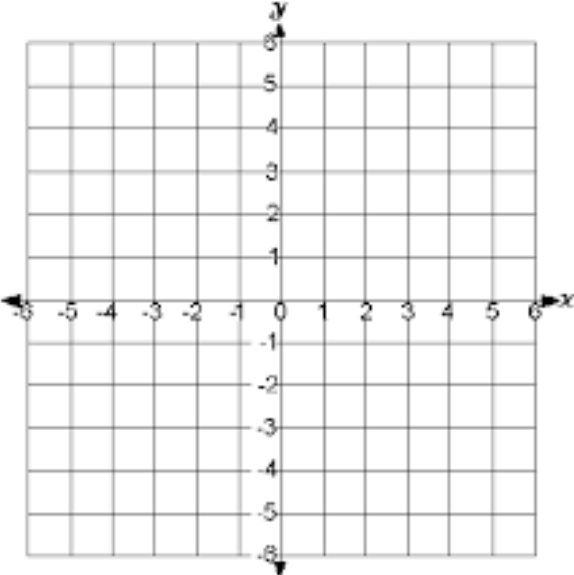
(b) (4 points) Find the maximum/minimum value of q and state whether it is a maximum or minimum value. Then give the range of q .

(c) (4 points) Does the graph of $y = q(x)$ intersect the x -axis? If so, give the x -intercepts in simplified form.

2. (8 points) In the coordinate plane below, sketch the graph of $y = x^8 - 29x^6 + 100x^4$. Do not worry about the scale of the y -axis.



3. (8 points) In the coordinate plane below, sketch the graph of $y = -(x + 4)^8(x + 1)^5(x - 2)^6$. Do not worry about the scale of the y -axis.



4. In the coordinate plane below, sketch and label the graphs of the following equations. If a graph has an asymptote, sketch and label that as well.

(a) (4 points) $y = 2^x$

(b) (4 points) $y = \left(\frac{1}{2}\right)^x$

(c) (4 points) $y = 2^{x+4} - 2$

