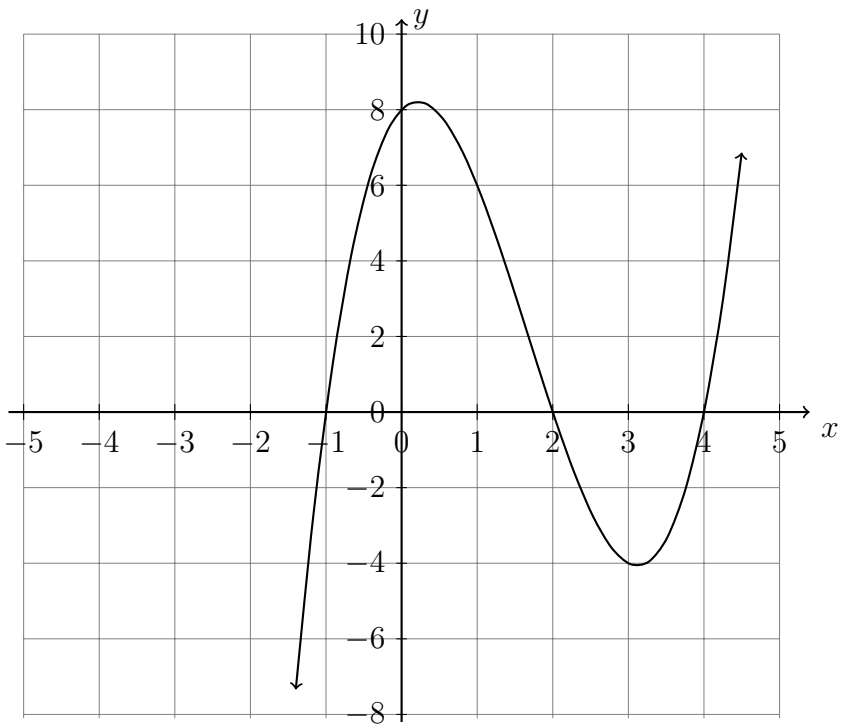
BECA / IB Math 03-Quadratic functions Name:
25 January 2022

4.2 Classwork: Cubic functions

1. Part of the function $f(x) = x^3 - 5x^2 + 2x + 8$ is shown on the graph.



(a) Write down the y-intercept.

(b) Show that $f(0)$ is the y-intercept by substituting $x = 0$ into the function $f(x)$.

(c) Write down the x-intercepts.

(d) Show that 2 is an x-intercept because $x = 2$ is a solution to $f(x) = 0$.

(e) What is the end behavior?

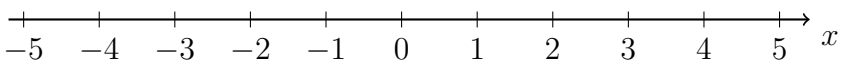
i. As $x \to +\infty$ does $y \to +\infty$ or $-\infty$?

ii. As $x \to -\infty$ does $y \to +\infty$ or $-\infty$?

(f) Label the local maximum and local minimum as ordered pairs (approximate the values).

(g) Slope: on the x-axis below, label the portion of the domain where f is increasing with pluses ("+") and decreasing with negative signs ("-"). Mark the extema (maximum and minimum) with zeros since $f(x)$ is horizontal at those points.

(h) Write down the intervals the function is increasing and decreasing.



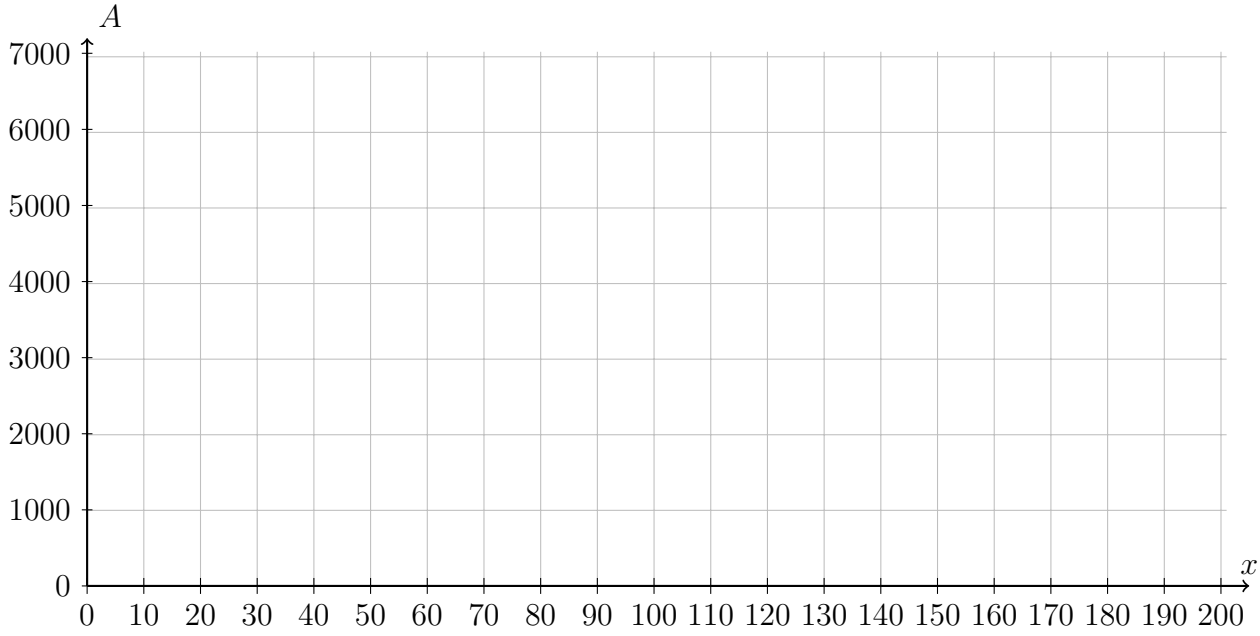
2. A rectangular picture frame has a perimeter of 320 centimeters.

   (a) Let x be the width of the frame in cm. Find an expression in terms of x for the height of the frame.

   (b) Find an expression for the area of the frame, $A\,\text{cm}^2$, in terms of x.

   (c) Plot a graph of how the area varies with width. Mark the coordinates of the vertex and x-axis intercepts.

   (d) Explain what the coordinates of the vertex represent in the context of the situation.



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Sum of an arithmetic series: $S_n = \frac{n}{2}(2u_1 + d(n-1))$

3. The first four terms of an arithmetic sequence are 6, 10, 14, 18.

   (a) Write down the common difference, d.

   (b) Show the the sum to n terms can be written as $2n^2 + 4n$.

   (c) The sum of n terms is 880. Write a quadratic equation to represent this information. Rearrange to equal zero and plot the function, showing the x-intercepts and the coordinates of the vertex.

   (d) State what information the positive x-intercept tells you about the sequence.