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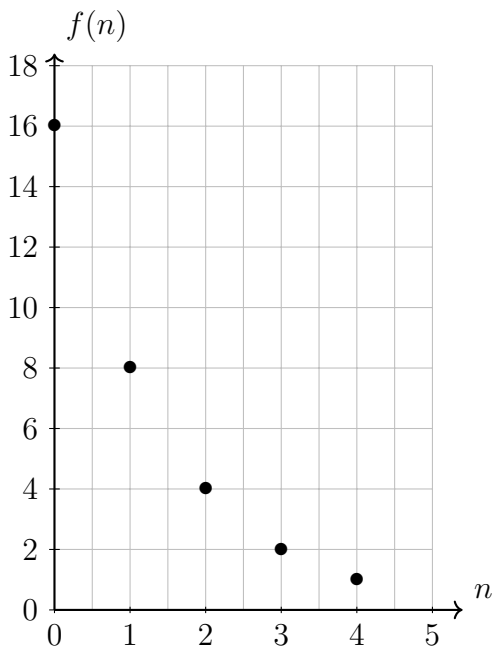
11 October 2023

1.13 PreTest2: Graphing sequences

1. A sequence f is shown below as a graph and as a table.



n	$f(n)$
0	16
1	8
2	4
3	2
4	1

(a) Is sequence f geometric or arithmetic? Explain how you know.

(b) Write an equation to define sequence f recursively.

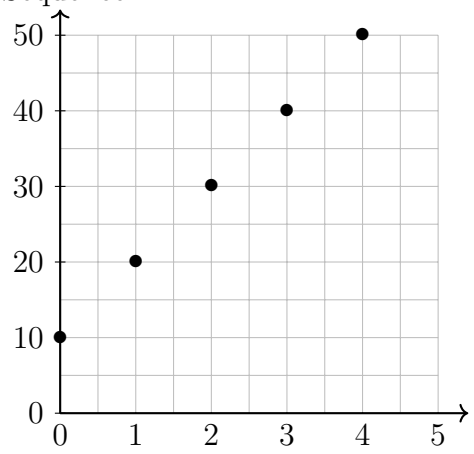
(c) For term $f(n)$, what are some values of that make sense to use? What are some values of n that don't make sense to use? Explain your reasoning.

2. Here are two sequences:

Sequence A

term number	value
0	$\frac{1}{9}$
1	$\frac{1}{3}$
2	1
3	3
4	9

Sequence B



(a) For sequence A, describe a way to produce each new term from the previous term.

(b) For sequence B, describe a way to produce each new term from the previous term.

(c) Write a definition for the n^{th} term of sequence A. (an explicit formula, not a recursive one)

(d) Write a definition for the n^{th} term of sequence B.

(e) If these sequences continue, then which is greater, A or B? Explain or show how you know.

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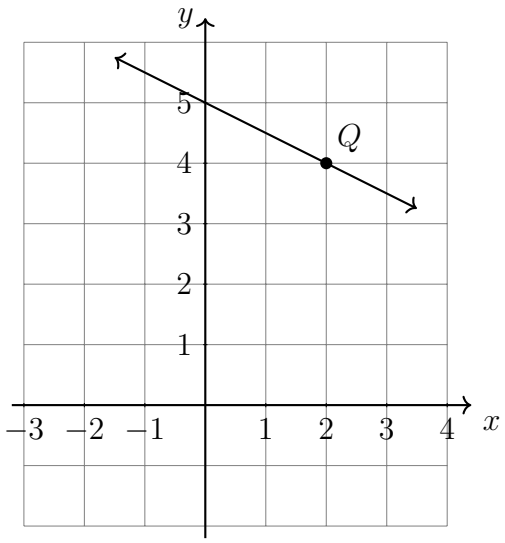
3. A linear function f is graphed below.



   (a) Write down it's slope.
   $m =$

   (b) Write down it's y-intercept.
   $b =$

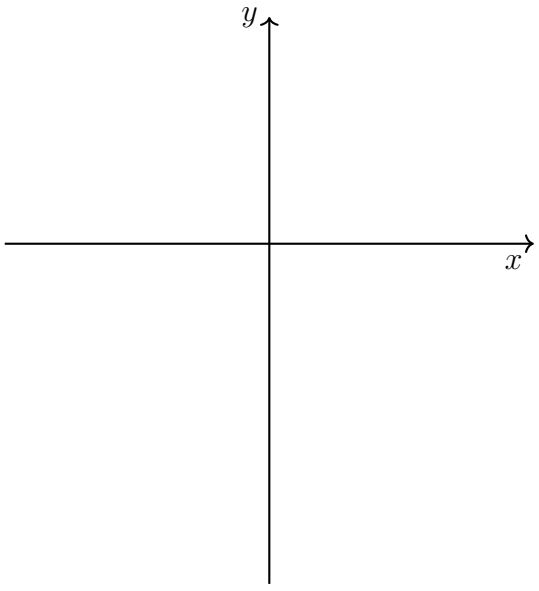
   (c) Write down the equation of the line.

   (d) State the coordinates of the point Q.

4. Write the linear equation $y - 1 = \frac{1}{2}(x + 8)$ in the form $y = mx + c$.

5. Given $f(x) = (x - 1)(x + 5)$

   (a) Sketch the function. Label the vertex as an ordered pair and mark the intercepts with their values.



   (b) Expand the function to standard form, $f(x) = ax^2 + bx + c$ where $a, b, c \in \mathbb{R}$.

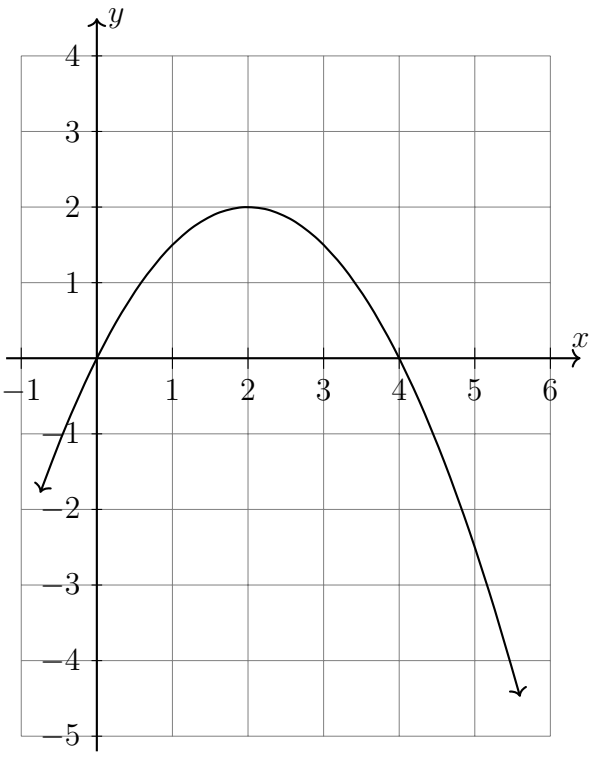
6. The function $f(x) = -\frac{1}{2}x^2 + 2x$ is shown on the graph.

   (a) Write down its vertex as an ordered pair.

   (b) Write down its domain and range.

   (c) Write down $f(0)$.

   (d) Write down two solutions to $f(x) = 0$.



7. Consider the function $f(x) = x^2 + 4x - 12$. (graph it to answer the questions)

   (a) This function can also be written in the form $f(x) = (x - p)^2 - 16$.
   Write down the value of p.

   (b) The graph of f has two solutions for $f(x) = 0$. Write down the solutions (or roots, zeros) of the function.

   (c) Hence, write down the function in factored form, $f(x) = (x - a)(x - b)$.

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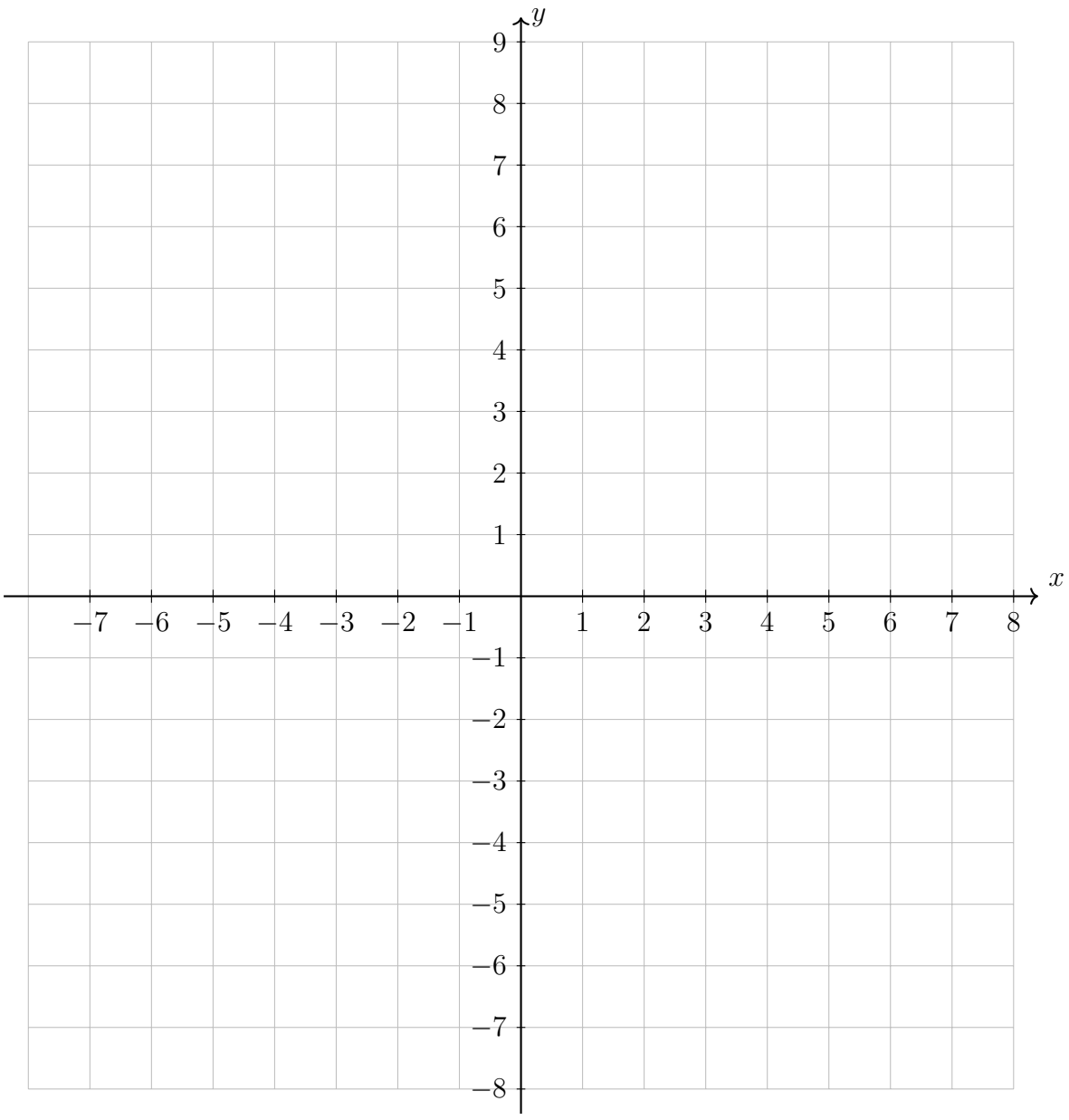
8. Given two functions, a quadratic function $f(x) = 0.8x^2 + 3.2x - 2$ and a linear function $g(x) = 0.8x + 1.2$.

   (a) Graph the parabola $y = f(x)$, marking the y-intercept and the vertex as an ordered pair.

   (b) Find the coordinates of the two intercepts with the x-axis, the roots or zeros of $f(x)$.

   (c) Plot the linear function, $y = g(x)$. Mark and label the two intersections of the two functions $f(x) = g(x)$ as ordered pairs.



9. A dart is shot vertically upwards.

   The path of the dart can be modelled by the equation $h(t) = 8t - t^2$ where $h(t)$ is the height in meters of the dart after t seconds.

   (a) Plot a graph of this equation and hence sketch it below, showing the coordinates of the vertex and axes intercepts.

   (b) Find the t-intercepts and explain what these values represent.

   (c) Find the equation of the axis of symmetry, and state what this tells you in the context of the problem.