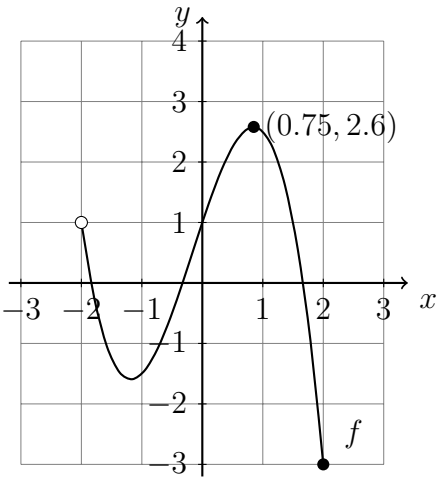
BECA / IB Math 03-Quadratic functions Name:
9 February 2022

**4.9 PreQuiz: Polynomial and rational functions**

1. The graph of a function $f$ is shown on the grid below.



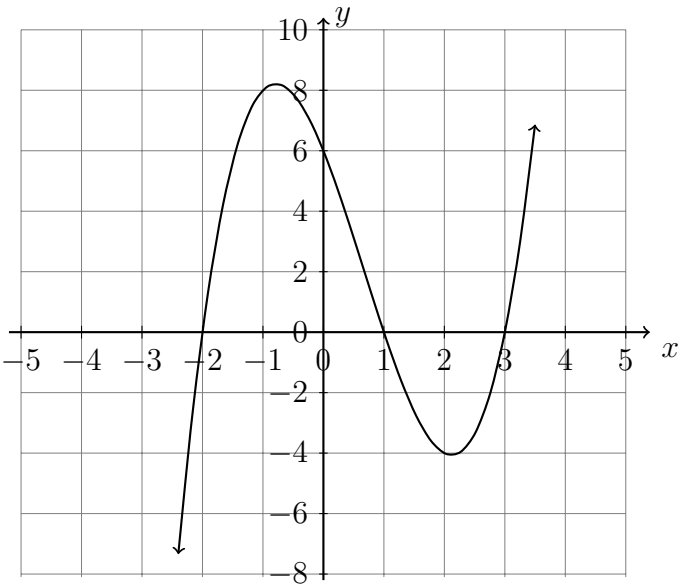

   (a) Write down $f(0)$

   (b) Find $x$ for $f(x) = -3$.

   (c) Write down the domain.

   (d) Write down the range.

2. Part of the function $f(x) = x^3 - 2x^2 - 5x + 6$ is shown on the graph.




   (a) Write down the $y$-intercept.

   (b) Write down the $x$-intercepts.

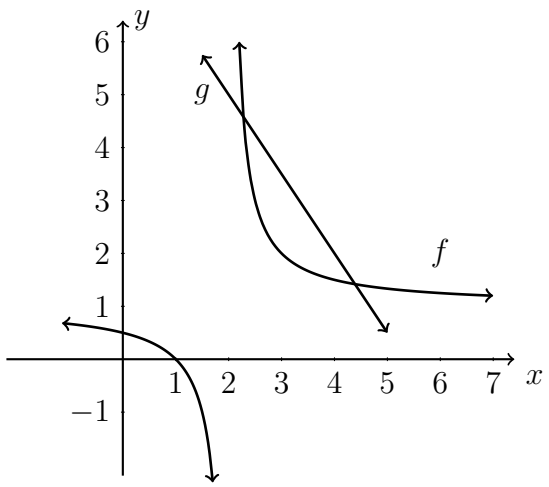
   (c) Label the local maximum and local minimum as ordered pairs.

   (d) Show that 1 is an $x$-intercept because $x = 1$ is a solution to $f(x) = 0$.

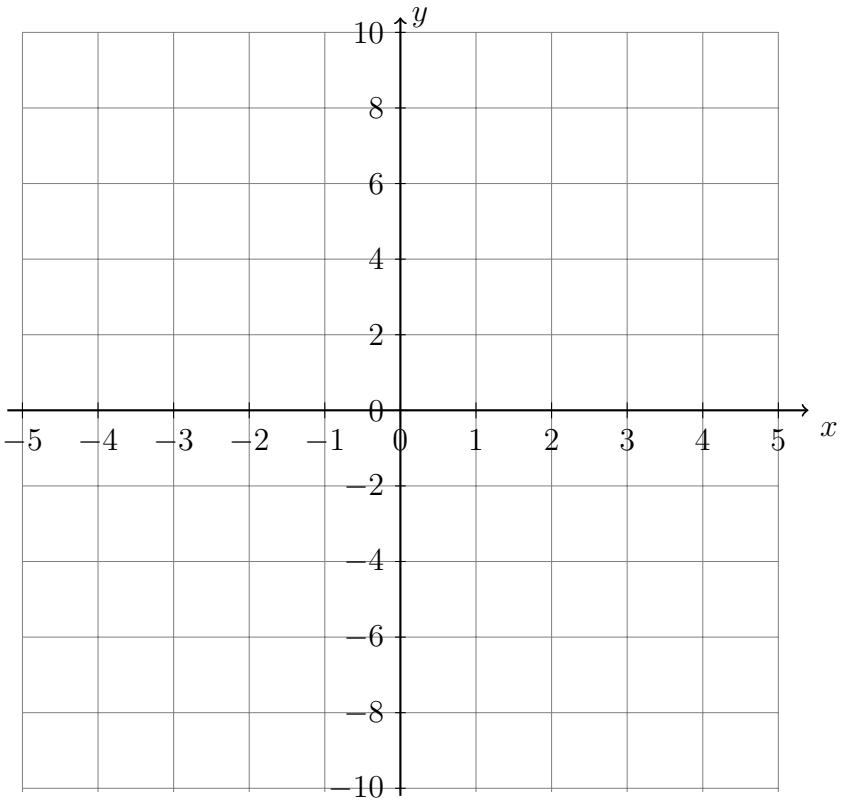
3. The rational function $f(x) = \dfrac{1}{x-2} + 1$ and the linear function $g(x) = -\dfrac{3}{2}x + 8$ are graphed below.

   (a) Find the solutions to $f(x) = g(x)$.

   (b) Write down the equation of the vertical asymptote to $f$.

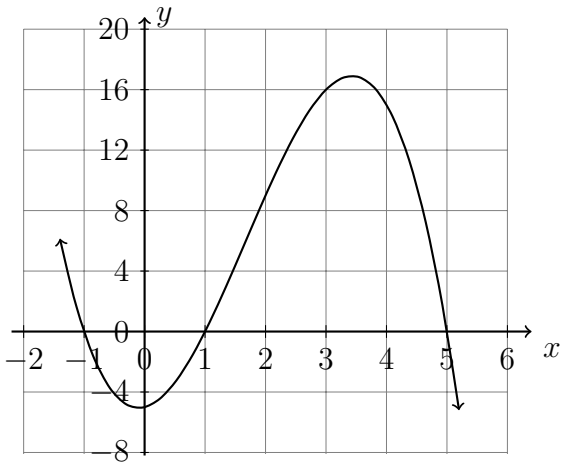



4. Plot the function $h(x) = x^3 + x^2 - 6x$, labeling the $x-$ and $y$-intercepts. Mark the local maximum and minimums as ordered pairs.



BECA / IB Math 03-Quadratic functions Name:
9 February 2022

5. A cardboard box manufacturing company is building boxes with length represented by $x+1$, width by $5-x$, and height by $x-1$. The volume of the box is modeled by the function below.




(a) Over what interval of positive $x$ values is the volume positive?

(b) Estimate the maximum possible volume of the box.

(c) Approximately the value of $x$ would maximize the volume of the box.

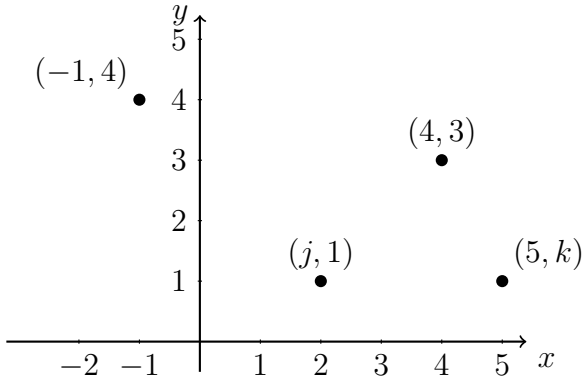
6. A function composed of four points $\{(-1,4),(j,1),(4,3),(5,k)\}$ is plotted on the below.

(a) Write down $j$

(b) Write down $k$

(c) Write down the domain.

(d) Add an ordered pair to the relation so that it would *not* be a function.

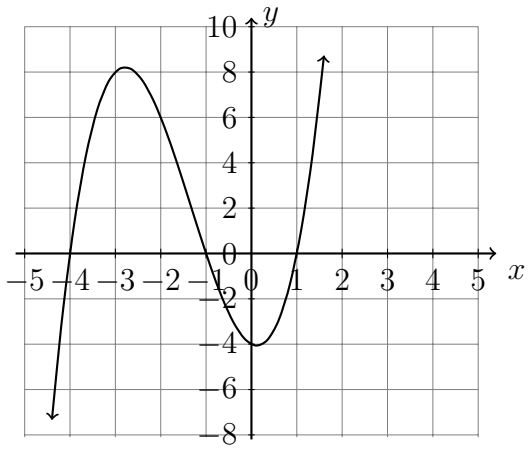



7. Shown in the plot below is the function $f(x) = x^3 + 4x^2 - 1x - 4$.

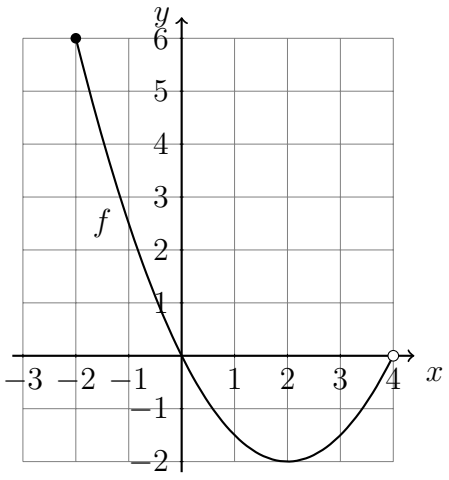
(a) Write down the value of $f(0)$. On the graph, mark the point for $f(0)$ with a star.

(b) Write down the solutions to $f(x) = 0$. Mark them with "X" marks on the graph.

(c) Mark the portion of the function that is *decreasing* with a squiggly line.




8. The graph of a function $f$ is shown on the grid below.



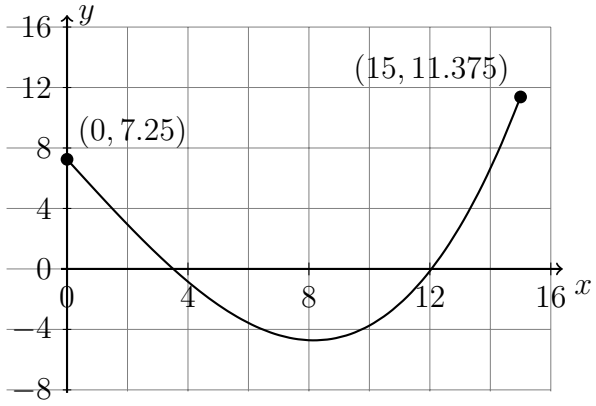

(a) Write down $f(2)$

(b) Find $x$ for $f(x) = 6$.

(c) Write down the domain.

(d) Write down the range.

9. The ramp in a skateboard park is modeled by the cubic function $h(x) = 7.25 - 2.2x + 0.011x^3$ where $h$ is the height in feet above ground and $x$ is the horizontal distance (ft).



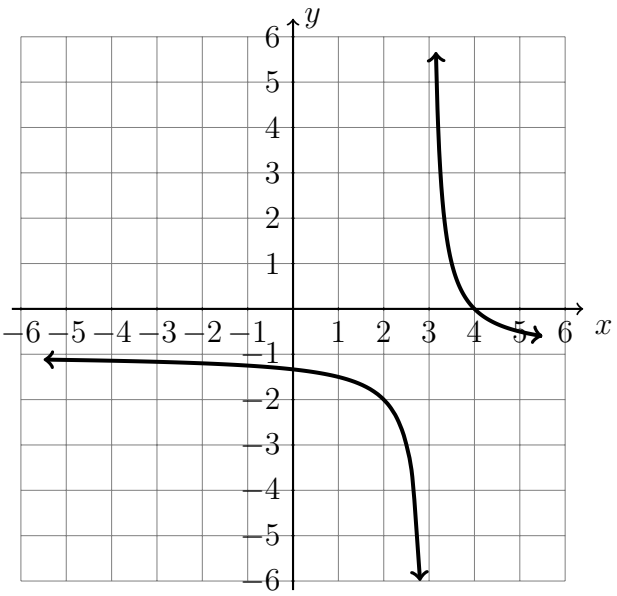

(a) How wide is the ramp in feet?

(b) Which lip is higher, the right or left lip? By how much?

(c) What is the maximum depth below ground of the ramp?

BECA / IB Math 03-Quadratic functions Name:
9 February 2022

10. A rational function of the form $f(x) = \dfrac{1}{x+p} + q$ is shown on the grid below.




(a) Write down the equation of the horizontal asymptote.

(b) Write down the equation of the vertical asymptote.

(c) Hence, write down $p$ and $q$.

(d) Find $f(0)$.

(e) Solve for $x$ such that $f(x) = 0$.

11. The temperature ($C^\circ$) over a 24 hour day starting at midnight is modeled by the function $f(t) = -0.0075t^3 + 0.17t^2 + 0.02t + 5$.

(a) Write down the temperature at midnight, when $t = 0$.

(b) Over what interval is the temperature increasing?

(c) Find the maximum temperature during the day.