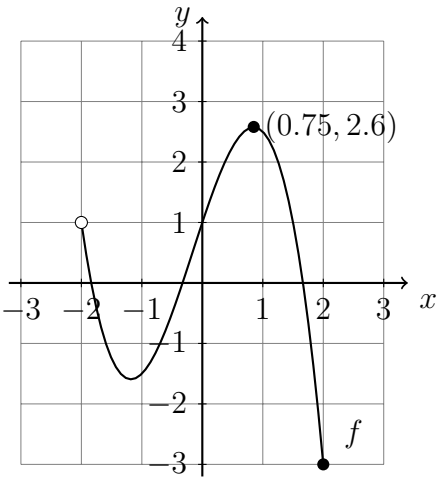
BECA / IB Math 4-Polynomial and rational functions Name:
9 February 2022

4.9 PreQuiz: Polynomial and rational functions

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



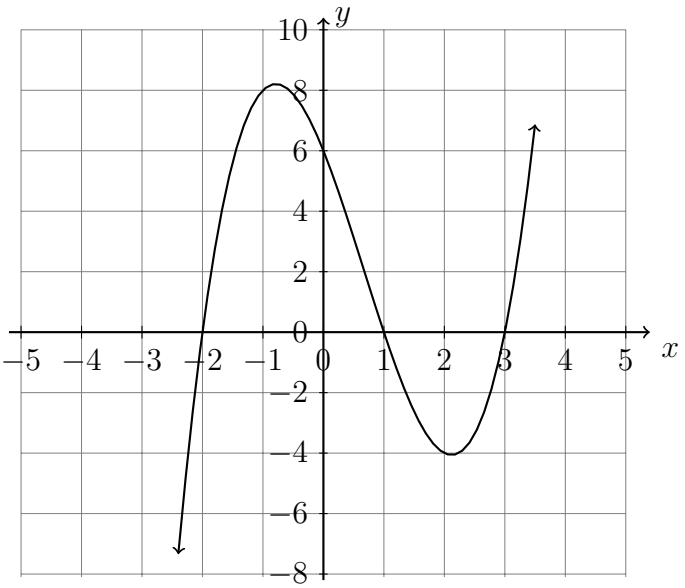
   (a) Write down $f(0)$

   (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.

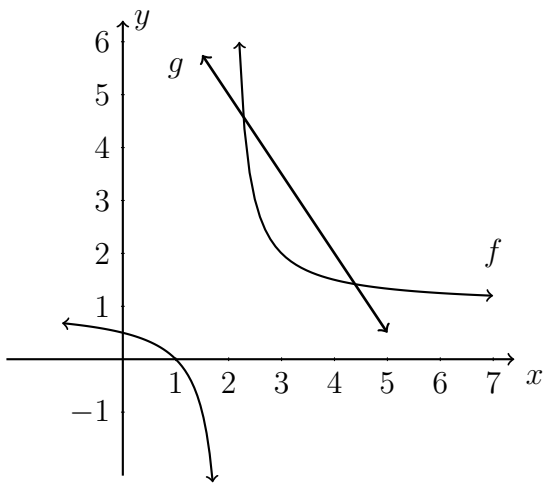
   (c) Label the local maximum and local minimum as ordered pairs.

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

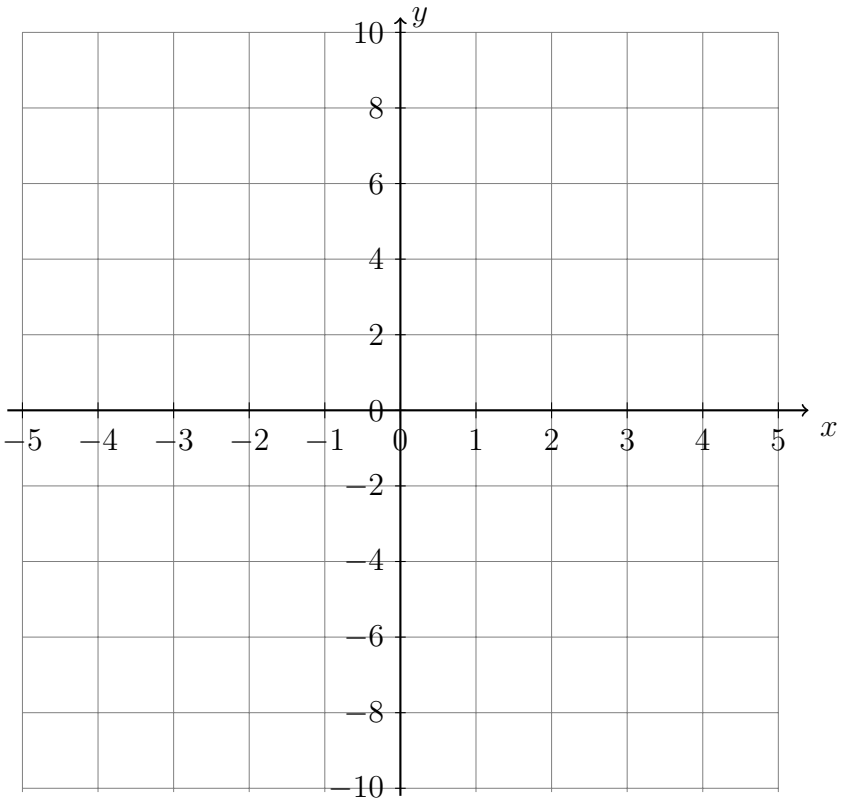
3. The rational function $f(x) = \dfrac{1}{x-2} + 1$ and the linear function $g(x) = -\dfrac{3}{2}x + 8$ are graphed below.

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

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

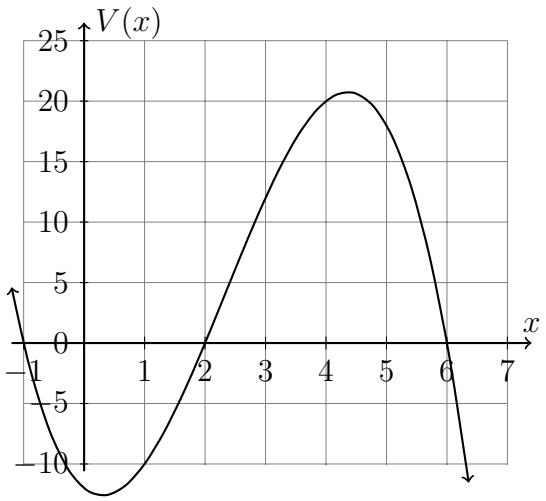


4. Plot the function $h(x) = x^3 + x^2 - 6x$, labeling the $x-$ and y-intercepts. Mark the local maximum and minimums as ordered pairs.



BECA / IB Math 4-Polynomial and rational functions Name:
9 February 2022

5. A cardboard box manufacturer is building boxes with length represented by $x + 1$, width by $6 - x$, and height by $x - 2$. The volume of the box is modeled below.



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

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

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

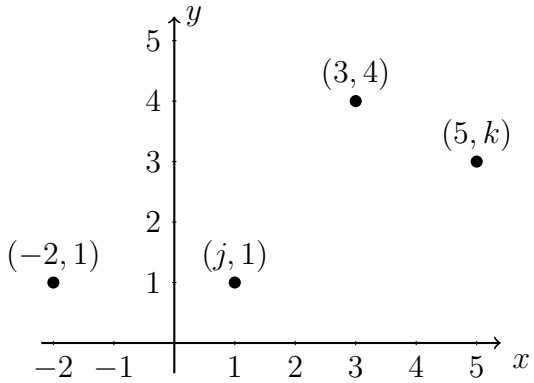
6. A function composed of four points $\{(-2, 1), (j, 1), (3, 4), (5, k)\}$ is plotted on the below.

(a) Write down j

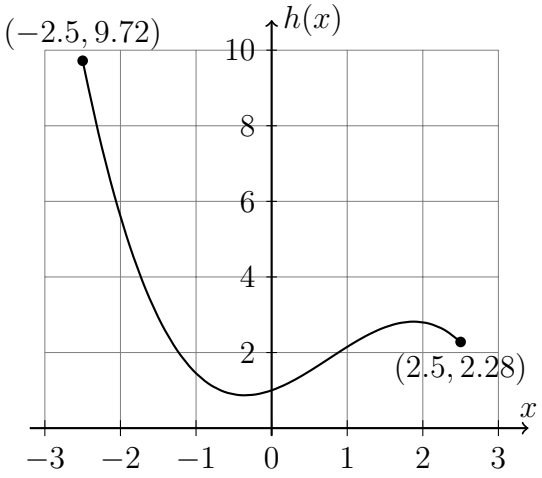
(b) Write down k

(c) Write down the domain.

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



7. A ski jump is modeled by the cubic function $h(x) = 1.0 + 0.7x + 0.8x^2 - 0.35x^3$ where h is the height in meters above ground and x is the horizontal distance (m).



(a) The two ends of the ramp are marked as ordered pairs. How wide is the ramp in meters?

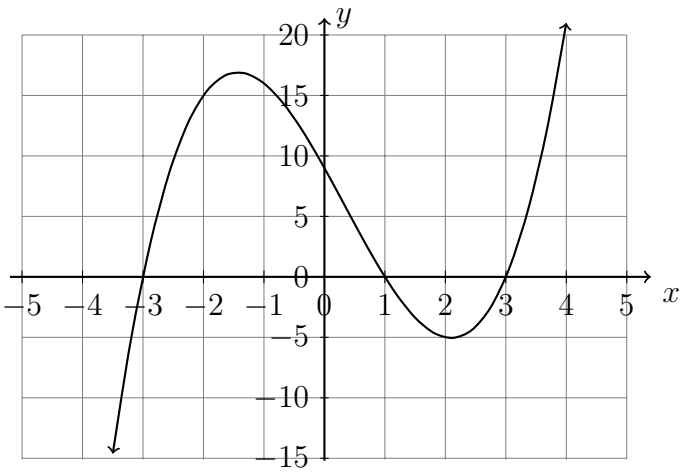
(b) What is the total vertical descent from the top of the ramp to its lowest point?

8. Shown in the plot below is the function $f(x) = x^3 - x^2 - 9x + 9$.

   (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.



9. The function $f(x) = ax^2 + bx + c$ is graphed below over its domain, $p \leq x < q$.

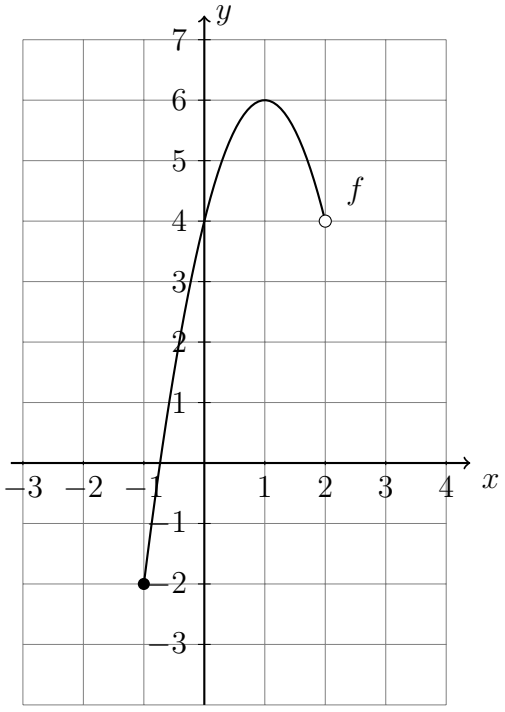
   (a) Write down the value of c.

   (b) Write down $f(-2)$.

   (c) Find x such that $f(x) = 6$.

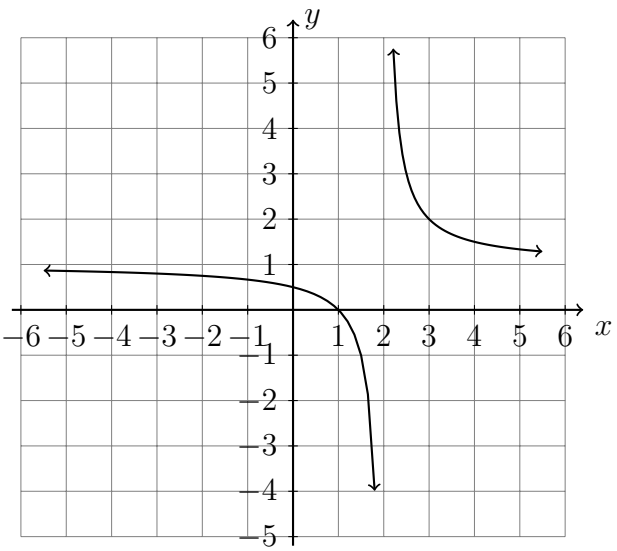
   (d) Write down the values of p, q.

   (e) Write down the range of f.



BECA / IB Math 4-Polynomial and rational 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°) over a 24 hour day starting at midnight is modeled by the function $f(t) = -0.0063t^3 + 0.12t^2 + 0.38t + 9$.

(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.