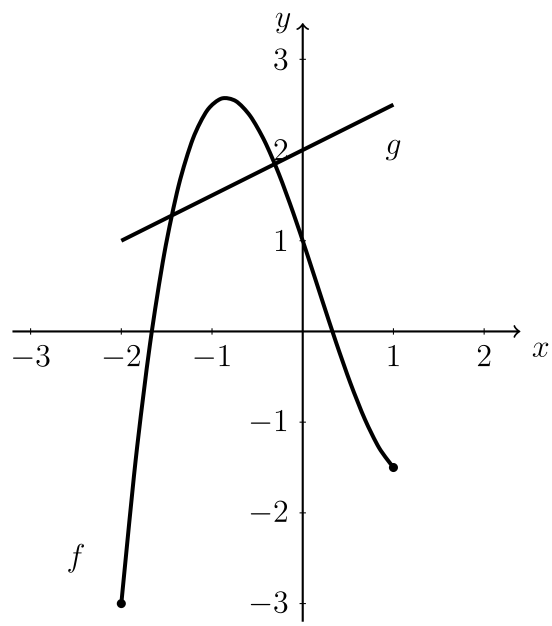
BECA / IB Math 03-Quadratic functions Name:
4 February 2022

4.7 Classwork: Direct and inverse variation

1. The functions $f(x) = x^3 - 0.5x^2 - 3x + 1$ and $g(x) = 0.5x + 2$ are defined over the domain $[-2, 1]$ as shown on the grid below. Find the two points where $f(x) = g(x)$. (the intersections)



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

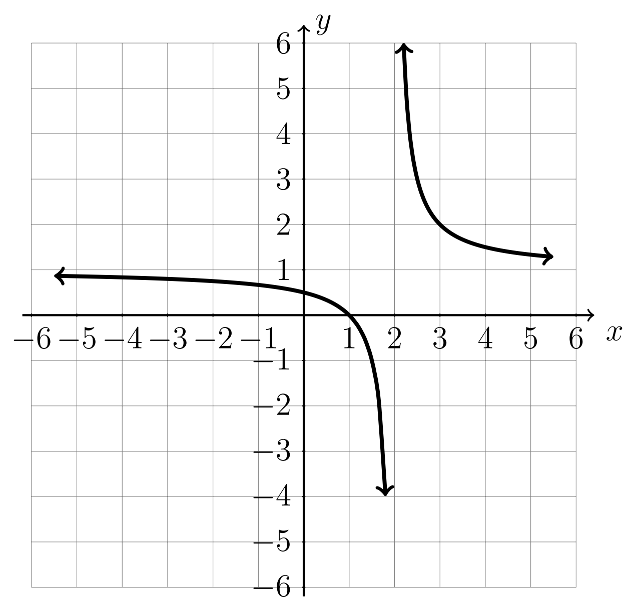
   (a) Write down the equation of the horizontal asymptote.

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

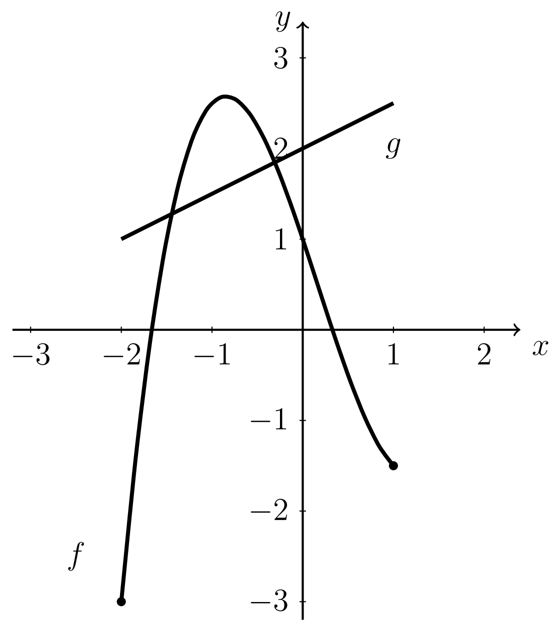
   (c) Hence, write down p and q.

   (d) Find $f(0)$.

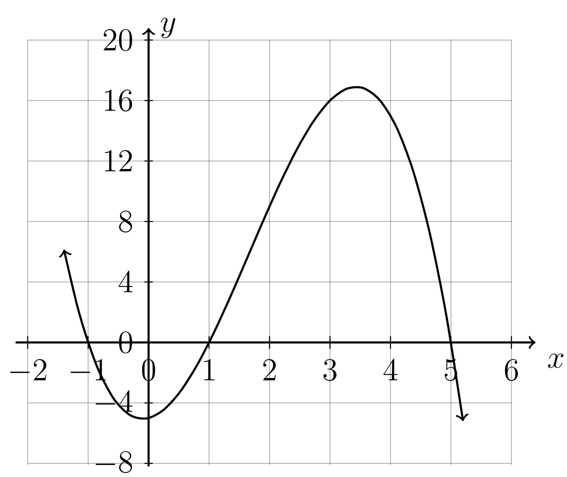
   (e) Solve for x such that $f(x) = 0$.



3. The functions $f(x) = x^3 - 0.5x^2 - 3x + 1$ and $g(x) = 0.5x + 2$ are defined over the domain $[-2, 1]$ as shown on the grid below. Find the two points where $f(x) = g(x)$. (the intersections)



4. 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) Find the value of x would maximize the volume of the box.

5. 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.

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