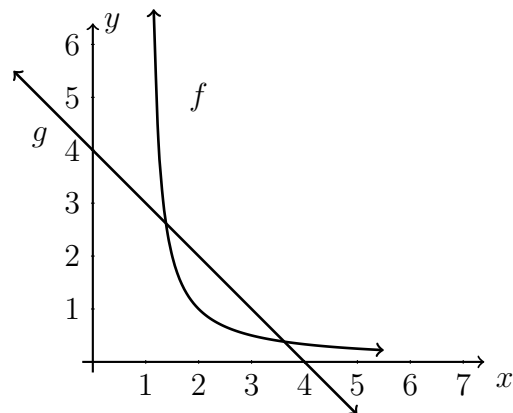


4.8 Classwork: Direct and inverse variation

1. The inverse function $f(x) = \frac{1}{x-1}$, defined for $x > 1$, and the linear function $g(x) = -x + 4$ are graphed below.

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

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



2. The total tuition charged by a college undergraduate program is proportional to the number of full-time semesters attended. (values are for Lehman College, ignoring aid.)

(a) Write down an equation to model the cost, using the variable C as the total tuition cost and s for the number of semesters.

(b) Explain what the proportionality constant, k , means in this context.

(c) If a student pays total tuition of \$27,720 over four years of full-time study, find the cost of a single semester.

(d) A student takes an extra three semesters. Find the additional tuition cost.

3. Two friends share an apartment convenient to Lehman, each paying \$1,500 per month.

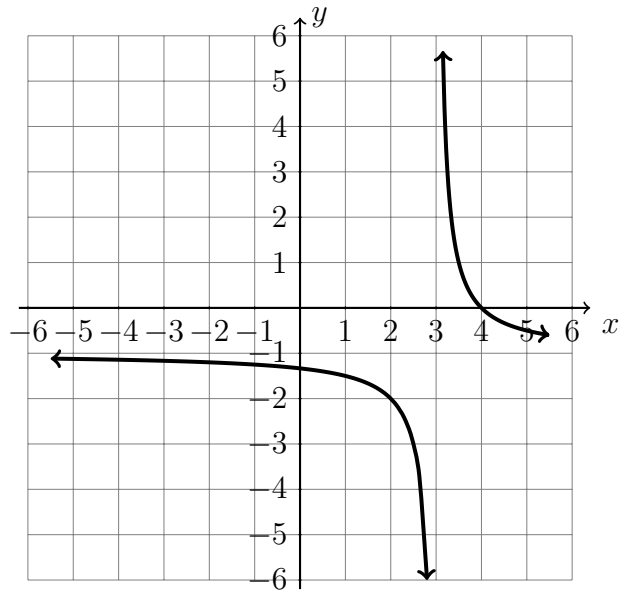
(a) Model the apartment cost as an inverse variation, with r as each individual's monthly rent share and f for the number of friends in the apartment.

(b) Explain what the proportionality constant, k , means in this context.

(c) If they add a third roommate, how much would that lower the monthly rent for the first two friends?

4. A rational function of the form $f(x) = \frac{1}{x-p} + q$ 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 $f(x) = 0$.
5. The temperature ($^{\circ}\text{C}$) 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.

