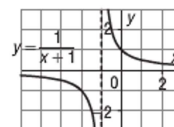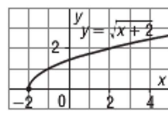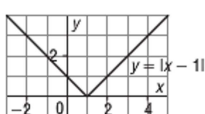# 4.1 Math Lab

MATH LAB

4.1 Combining Functions Graphically

FOCUS Sketch the graphs of functions that are the sum, difference, product, or quotient of two functions.

Get Started

What are the domain and the range of each function?

Construct Understanding

A. The graph below shows two functions: function A is college enrolment and function B is university enrolment for the past few years. On the same grid, sketch a graph to show the total post-secondary enrolment for these years. Describe your strategy.


Full-Time Post-Secondary Enrolment in Canada
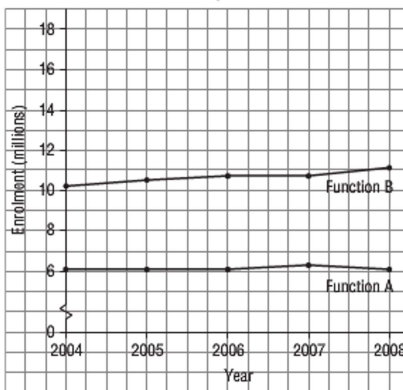
B. The stopping distance for a car is a function of the speed of the car when the brakes are applied:
Stopping distance = reaction-time distance + braking distance
The graph below shows functions for stopping distance and reaction-time distance against speed. On the same grid, sketch a graph for braking distance against speed. Describe your strategy.
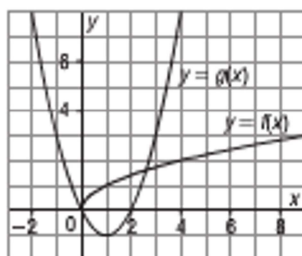
Stopping Distance for a Car

Stopping distance

Reaction-time
distance

Distance (m)

Speed (km/h)
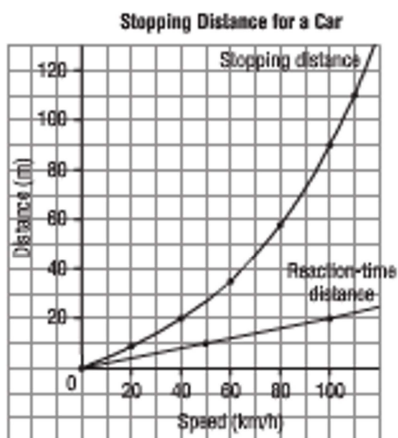
C. The graphs of $y = f(x)$ and $y = g(x)$ are shown. Adapt the strategy you used for Parts A and B to graph the product of these functions:
$y = f(x) \cdot g(x)$
Describe your strategy.
What are the domains of $y = f(x)$, $y = g(x)$, and $y = f(x) \cdot g(x)$?

$y = g(x)$

$y = f(x)$

D. The graphs of $y = f(x)$ and $y = g(x)$ are shown. Adapt the strategy you used for Parts A and B to graph the quotient of these functions:
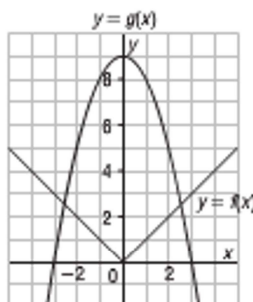
$$y = \frac{f(x)}{g(x)}$$

Describe your strategy.

What are the domains of $y = f(x)$, $y = g(x)$, and $y = \frac{f(x)}{g(x)}$?
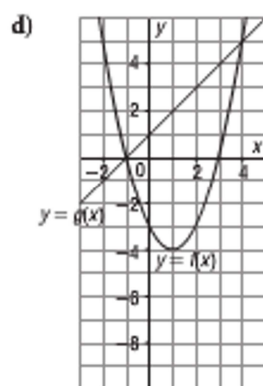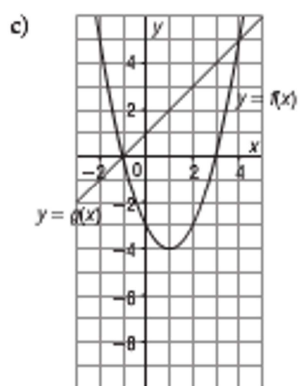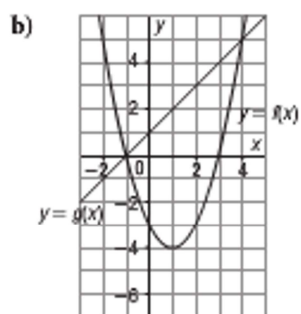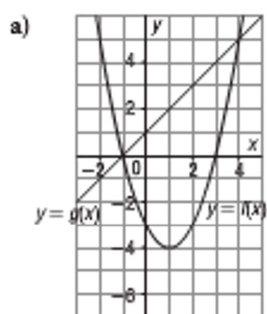
THINK FURTHER

For the graph in Part D, why is $y = \frac{f(x)}{g(x)}$ not a rational function? Explain.

Assess Your Understanding

1. Use the graphs of $y = f(x)$ and $y = g(x)$ on page 269 to sketch the graph of each function below, then identify its domain and range. Estimate the range, where necessary.

a) $y = f(x) + g(x)$ **b)** $y = f(x) - g(x)$

c) $y = f(x) \cdot g(x)$ **d)** $y = \frac{f(x)}{g(x)}$

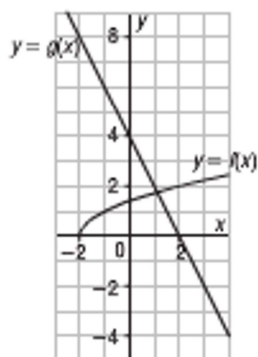**a)**

b)

c)

d)

2. Use the graphs of $y = f(x)$ and $y = g(x)$.

    a) State the domain and range of $y = f(x)$.

    b) State the domain and range of $y = g(x)$.

    c) Sketch the graph of $y = f(x) \cdot g(x)$.

    d) What is the domain of $y = f(x) \cdot g(x)$? How is it related to the domains of $y = f(x)$ and $y = g(x)$?