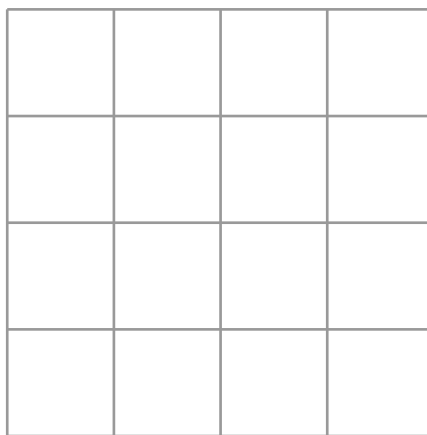
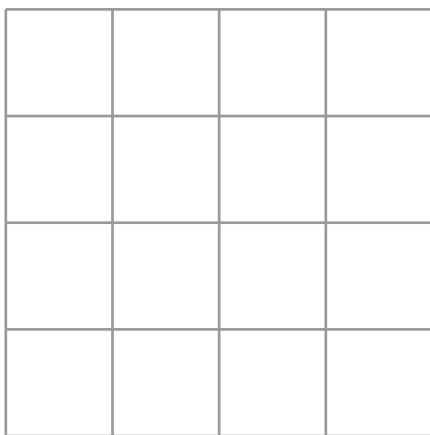


1. Let  $f$  be the function with domain  $[0, 3]$  given by

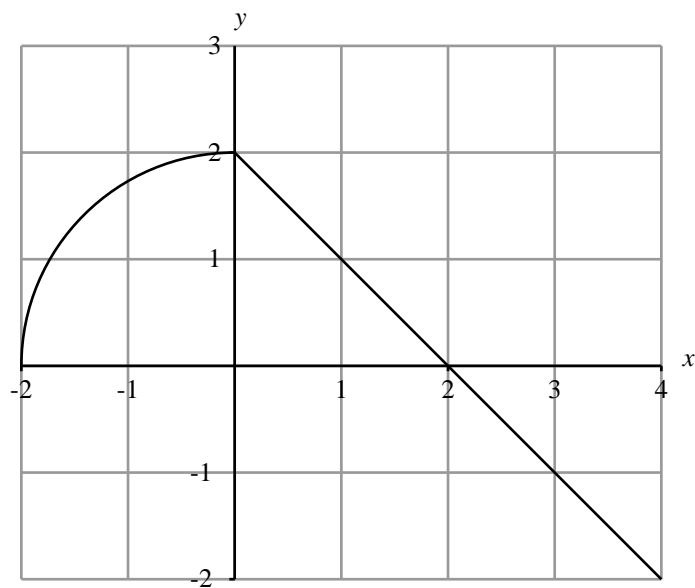
$$f(x) = \begin{cases} 2 & \text{if } 0 \leq x \leq 1 \\ |4 - 2x| & \text{if } 1 < x \leq 3 \end{cases}$$

- (a) Sketch a graph of  $f$  on one of the grids provided. (The other grid is for practice; be sure to indicate which one you want to count as your answer.)



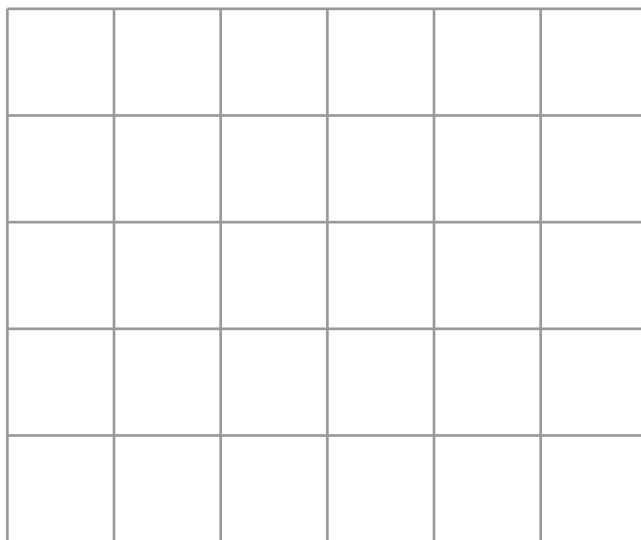
- (b) Find  $f \circ f\left(\frac{1}{2}\right)$ .

2. Here is the graph of a function  $f$ , defined on the interval  $[-2, 4]$ .



On the blank grid below, draw a graph of the function  $g$  given by

$$g(x) = 1 + f(2x).$$



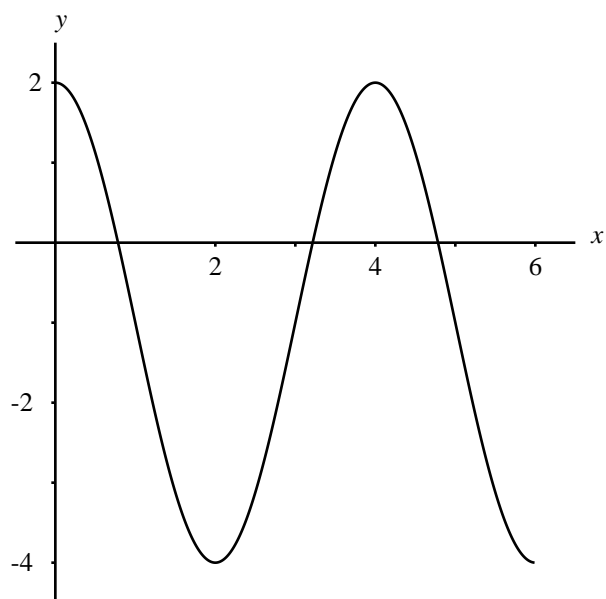
3. An air taxi service based at Barnes Airport can get a passenger from the gate at Barnes to the gate at an airport 105 miles away in one hour and thirty-five minutes. Using the same airplane, the service can get a passenger from the gate at Barnes to the gate at an airport 216 miles away in two hours and forty-nine minutes.

(a) Assuming a linear model is appropriate, find  $T$ , the gate-to-gate time for an air taxi trip, as a function of  $x$ , the distance from Barnes to the destination airport.

(b) What is the value of the slope of the line in part 3a, and what is its significance?

(c) What is the value of the  $T$ -intercept in part 3a, and what is its significance?

4. Below is the graph of the function  $A + B \cos(Cx)$ . Determine the values of  $A$ ,  $B$ , and  $C$ .



5. Let  $f$  be the function given by  $f(x) = \sqrt{x+2}$ .

(a) What is the largest possible domain for  $f$ ?

(b) Find a formula for  $f^{-1}(x)$ .

(c) What is the domain of  $f^{-1}$ ?

6. (a) Solve the equation  $5^{2-x} - 3 = 0$  for  $x$ .  
Write your answer in terms of natural logarithms.

- (b) Solve the equation  $\ln x + \ln(x - 2) = 3$  for  $x$ .  
Write your answer in exact form.

7. (a) Find the exact value of  $\sin\left(\cos^{-1}\left(\frac{2}{5}\right)\right)$ .

(b) Find the exact value of  $\cos^{-1}\left(\cos\left(\frac{13\pi}{10}\right)\right)$ .  
Give your answer in radians.