1. *Chapter 1, Section 1.1, Question 006

Assume that $f(x) = \dfrac{x + 1}{x^2 + 4}$ for every real number x. Evaluate and simplify $f\left(\dfrac{b}{3}\right)$.

$f\left(\dfrac{b}{3}\right) =$

2. *Chapter 1, Section 1.1, Question 009

Assume that $f(x) = \dfrac{x + 8}{x^2 + 1}$ for every real number x. Evaluate and simplify $f\left(x^2 + 2\right)$.

$f\left(x^2+2\right)=$

3. *Chapter 1, Section 1.1, Question 017

Assume that $g(x)=\dfrac{x-9}{x+4}$. Simplify the expression $\dfrac{g(a+t)-g(a)}{t}$.

$\dfrac{g(a+t)-g(a)}{t}=$

4. *Chapter 1, Section 1.1, Question 036

A formula $f(x) = \frac{\sqrt{3x+4}}{x-8}$ has been given defining the function f but no domain has been specified. Find the domain of the function f, assuming that the domain is the set of real numbers for which the formula makes sense and produces a real number.

The domain of the function f is

.

5. *Chapter 1, Section 1.3, Intelligent Tutoring Question 04

Shifting a graph up or down

Suppose f is a function and $a > 0$. Define functions g and h by

$g(x) = f(x) + a$ and

$h(x) = f(x) - a$.

Then

- the graph of g is obtained by shifting the graph of f up a units
- the graph of h is obtained by shifting the graph of f down a units.

*Part 1

Assume that f is the function defined on the interval [1, 2] by the formula $f(x) = 2x^2 + 6$.
The graph of g is obtained by shifting the graph of f down 4 units.

Write the formula for g.

$g(x) =$

***Part 2**

What is the domain of *g*?

[

1 , 2]

***Part 3**

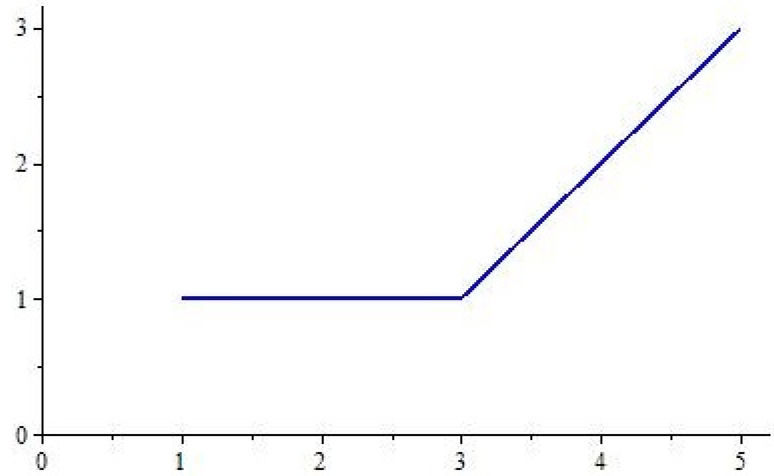
What is the range of *g?*

[

4 , 10]

6. *Chapter 1, Section 1.3, Question 22

Assume f is a function whose domain is the interval $[1, 5]$, whose range is the interval $[1, 3]$, and whose graph is the figure below.



The graph of f .

Consider the function $g(x) = f(x + 2)$.

(a) Find the domain of g .

Enter your answer in interval notation.

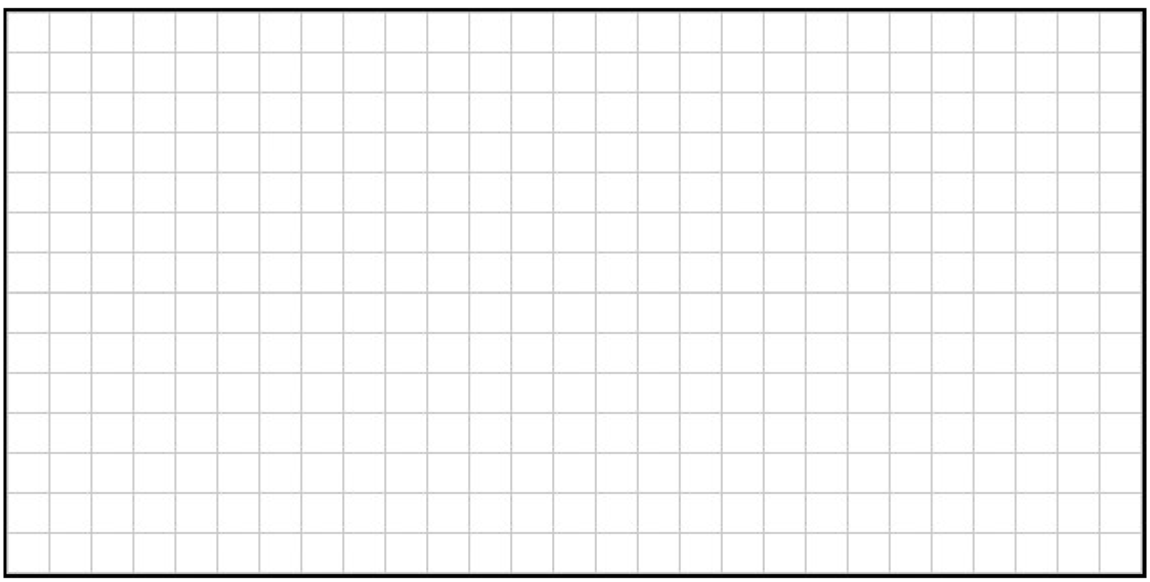
$D(g) =$

(b) Find the range of g .

Enter your answer in interval notation.

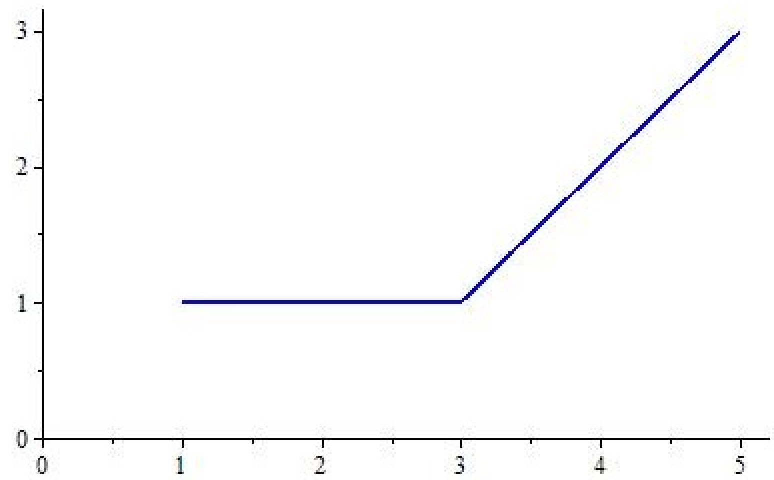
$R(g) =$

(c) Sketch the graph of g .



7. *Chapter 1, Section 1.3, Question 30

Assume f is a function whose domain is the interval $[1, 5]$, whose range is the interval $[1, 3]$, and whose graph is the figure below.



The graph of f .

Consider the function $g(x) = 2f(x) + 3$.

(a) Find the domain of g .

Enter your answer in interval notation.

$D(g) =$

(b) Find the range of g .

Enter your answer in interval notation.

$R(g) =$

(c) Sketch the graph of g.

8. *Chapter 1, Section 1.3, Question 060

Suppose that to provide additional funds for higher education, the federal government adopts a new income tax plan that consists of the 2011 income tax plus an additional $100 per taxpayer. Let g be the function such that $g(x)$ is the 2011 federal income tax for a single person with taxable income x dollars, and let h be the corresponding function for the new income tax plan.

Write a formula for $h(x)$ in terms of $g(x)$.

$h(x) =$

9. *Chapter 1, Section 1.4, Question 039

Suppose

$$h(x) = \left(\frac{x^2 + 3}{x - 10} - 1\right)^3 .$$

(a) If $f(x) = x^3$, then find a function g such that $h = f \circ g$.

$g(x) =$

(b) If $f(x) = (x - 1)^3$, then find a function g such that $h = f \circ g$.

$g(x) =$

10. *Chapter 1, Section 1.4, Question 040

Suppose

$$h(x) = \sqrt{\frac{1}{x^2 + 9} + 18}.$$

(a) If $f(x) = \sqrt{x}$, then find a function g such that $h = f \circ g$.

$g(x) =$

(b) If $f(x) = \sqrt{x + 18}$, then find a function g such that $h = f \circ g$.

$g(x) =$

11. *Chapter 1, Section 1.4, Question 043

Find functions f and g, each simpler than the given function $h(x) = \left(x^2 - 2\right)^2$, such that $h = f \circ g$.

a. $f(x) = x^2 - 2,\ g(x) = x^2$

b. $f(x) = x^2,\ g(x) = x - 2$

c. $f(x) = x,\ g(x) = x - 2$

d. $f(x) = x,\ g(x) = x^2 - 2$

e. $f(x) = x^2,\ g(x) = x^2 - 2$

Answer: e

12. *Chapter 1, Section 1.4, Question 045

Find functions f and g, each simpler than the given function $h(x) = \dfrac{12}{5 + x^2}$, such that $h = f \circ g$.

a. $f(x) = 5 + x^2, \quad g(x) = \dfrac{12}{x}$

b. $f(x) = 5 + x, \quad g(x) = \dfrac{12}{x^2}$

c. $f(x) = \dfrac{12}{x}, \quad g(x) = 5 + x^2$

d. $f(x) = \dfrac{12}{x^2}, \quad g(x) = 5 + x$

e. $f(x) = \dfrac{12}{x}, \quad g(x) = \dfrac{12}{5 + x}$

Answer: c

13. *Chapter 1, Section 1.4, Question 047

Find functions f , g and h , each simpler than the function $T(x) = \dfrac{6}{8 + x^2}$, such that $T = f \circ g \circ h$.

a. $f(x) = 8 + x, \quad g(x) = \frac{6}{x}, \quad h(x) = x^2$

b. $f(x) = x^2, \quad g(x) = \frac{6}{x}, \quad h(x) = 8 + x$

c. $f(x) = 6x, \quad g(x) = \frac{1}{x^2}, \quad h(x) = 8 + x$

d. $f(x) = x^2, \quad g(x) = 8 + x, \quad h(x) = \frac{6}{x}$

e. $f(x) = \frac{6}{x}, \quad g(x) = 8 + x, \quad h(x) = x^2$

Answer: e

14. *Chapter 1, Section 1.4, Question 048

Find functions f , g , and h , each simpler than the function $T = \sqrt{5 + x^2}$ such that $T = f \circ g \circ h$.

a. $f(x) = \sqrt{5x}, \quad g(x) = 1 + x, \quad h(x) = x^2$

b. $f(x) = \sqrt{x}, \quad g(x) = 5 + x, \quad h(x) = x^2$

c. $f(x) = x^2, \quad g(x) = 5 + x, \quad h(x) = \sqrt{x}$

d. $f(x) = x^2, \quad g(x) = \sqrt{x}, \quad h(x) = 5 + x$

e. $f(x) = \sqrt{5x}, \quad g(x) = 5 + x, \quad h(x) = x^2$

Answer: b

15. *Chapter 1, Section 1.4, Question 052

Suppose f is a function and a function g is defined by

$$g(x) = f\left(-\frac{4}{5}x\right).$$

(a) Write g as the composition of f and one or two linear functions.

a. If $h(x) = -4x$ and $p(x) = \frac{1}{5}x$, then $g = p \circ h \circ f$.

b. If $h(x) = -4x$ and $p(x) = \frac{1}{5}x$, then $g = h \circ p \circ f$.

c. If $h(x) = -\frac{4}{5}$, then $g = f \circ h$.

d. If $h(x) = -\frac{4}{5}x$, then $g = f \circ h$.

e. If $h(x) = -\frac{4}{5}x$, then $g = h \circ f$.

Answer: d

(b) Describe how the graph of g is obtained from the graph of f.

a. The graph of g is obtained by vertically stretching the graph of f by a factor of $\frac{5}{4}$ and then flipping across the horizontal axis.

b. The graph of g is obtained by horizontally stretching the graph of f by a factor of $\frac{4}{5}$ and then flipping across the horizontal axis.

c. The graph of g is obtained by horizontally stretching the graph of f by a factor of $\frac{5}{4}$ and then flipping across the horizontal axis.

d. The graph of g is obtained by horizontally stretching the graph of f by a factor of $\frac{5}{4}$ and then flipping across the vertical axis.

e. The graph of g is obtained by horizontally stretching the graph of f by a factor of $\frac{4}{5}$ and then flipping across the vertical axis.

Answer: d