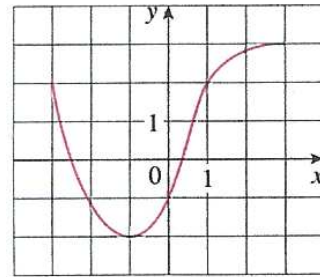


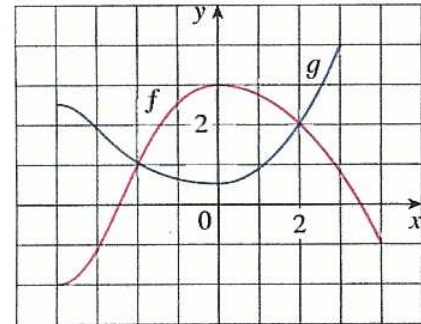
1. The graph of a function f is given.

- (a) State the value of $f(-1)$.
- (b) Estimate the value of $f(2)$.
- (c) For what values of x is $f(x) = 2$?
- (d) Estimate the values of x such that $f(x) = 0$.
- (e) State the domain and range of f .
- (f) On what interval is f increasing?



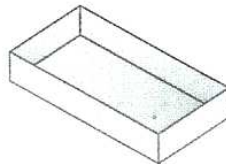
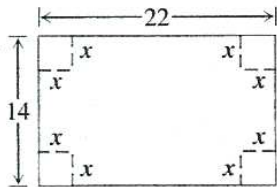
2. The graphs of f and g are given.

- (a) State the values of $f(-4)$ and $g(3)$.
- (b) For what values of x is $f(x) = g(x)$?
- (c) Estimate the solution of the equation $f(x) = -1$.
- (d) On what interval is f decreasing?
- (e) State the domain and range of f .
- (f) State the domain and range of g .
- (g) Estimate. Show your steps.
 - (i) $(f \circ g)(3)$
 - (ii) $(g \circ f)(-4)$
 - (iii) $(f \circ f)(0)$



3. Express the side length of a square as a function of the length d of the square's diagonal. Then express the area as a function of the diagonal length.

4. A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 14 in. by 22 in. by cutting out equal squares of side x at each corner and then folding up the sides as in the figure. Express the volume V of the box as a function of x .



5. Find the domain of the function $f(x)$.

(a) $f(x) = 1 - \sqrt{x}$.

(b) $f(x) = \frac{1}{\sqrt{4 - x^2}}$

6. Graph the functions. For each function determine its domain and range.

(a) $f(x) = 5 - 2x$

(b) $f(x) = 1 - 2x - x^2$

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

(d) $f(x) = \begin{cases} 3 - x & \text{if } x \leq 1 \\ 2x & \text{if } x > 1 \end{cases}$

7. Graph the functions by shifting the graphs of the functions \sqrt{x} or $\frac{1}{x}$ (as appropriate). For each function determine its domain and range.

(a) $y = \sqrt{x + 4}$

(b) $y = \frac{1}{x} + 2$

(c) $y = \frac{1}{x + 2}$

8. Find the domains of f , g , $f + g$, and $f \cdot g$.

(a) $f(x) = x$, $g(x) = \sqrt{x-1}$

(b) $f(x) = \sqrt{x+1}$, $g(x) = \sqrt{x-1}$

9. Find the domains of f , g , f/g , and g/f if

$f(x) = 2$, $g(x) = x^2 - 1$

10. If $f(x) = x + 5$ and $g(x) = x^2 - 3$, find the following.

(a) $f(g(0))$

(b) $g(f(0))$

(c) $f(g(x))$

(d) $g(f(x))$

11. If $u(x) = 4x - 5$, $v(x) = x^2$ and $f(x) = 1/x$, find formulas for the following.

(a) $u(v(f(x)))$

(b) $v(u(f(x)))$

(c) $f(u(v(x)))$

12. (a) Write a formula for $f \circ g$ and $g \circ f$ and (b) find the domain of each.

$f(x) = \sqrt{x+1}$, $g(x) = \frac{1}{x}$

13. Complete the following table.

	$g(x)$	$f(x)$	$(f \circ g)(x)$
a.	$x - 7$	\sqrt{x}	?
b.	$x + 2$	$3x$?
c.	?	$\sqrt{x-5}$	$\sqrt{x^2-5}$
d.	$\frac{x}{x-1}$	$\frac{x}{x-1}$?
e.	?	$1 + \frac{1}{x}$	x
f.	$\frac{1}{x}$?	x

14. Complete the following table of function values. If the function is undefined at a given angle, enter "UND". Do not use a calculator or tables.

θ	$-\pi$	0	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	$-\frac{\pi}{3}$	$-\frac{\pi}{6}$
$\sin \theta$						
$\cos \theta$						
$\tan \theta$						
$\cot \theta$						
$\sec \theta$						
$\csc \theta$						

15. Graph the functions. What is the period of each function?

(a) $\sin 2x$

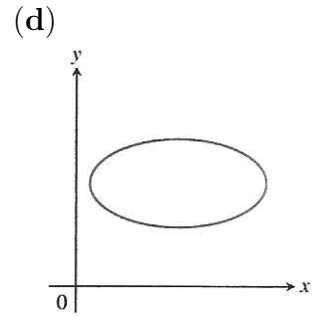
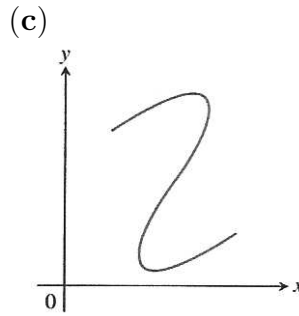
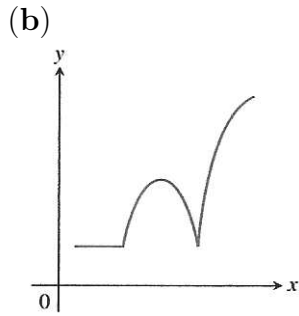
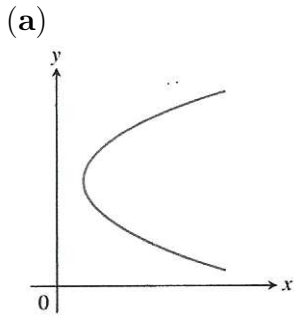
(b) $\sin(x/2)$

(c) $\cos \pi x$

(d) $\cos\left(x - \frac{\pi}{2}\right)$

16. Find $\cos x$ and $\tan x$ if $\sin x = \frac{3}{5}$, if $x \in \left[\frac{\pi}{2}, \pi\right]$.

17. Determine which of the following graphs are graphs of functions of x and which are not. Give reasons for your answers.



18. Say whether the function is even, odd, or neither. Give reasons for your answer.

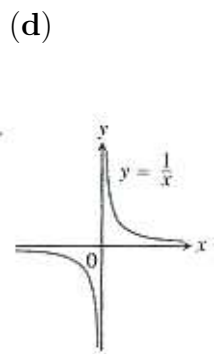
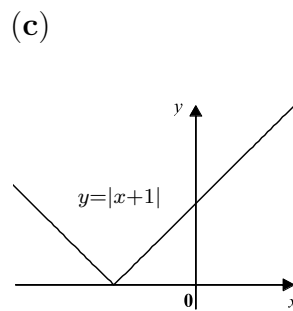
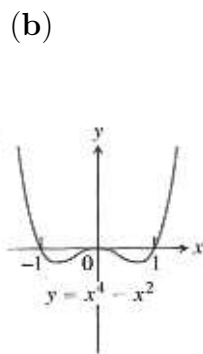
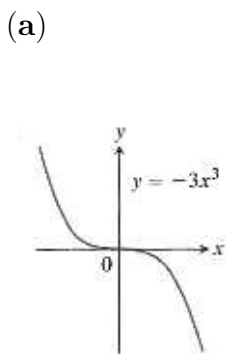
(a) $f(x) = 3$

(b) $f(x) = x^2 + 1$

(c) $f(x) = x^2 + x$

(d) $f(x) = x^3 + x$

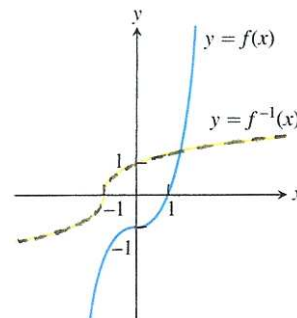
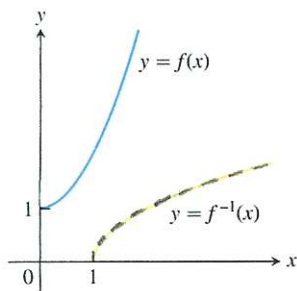
19. Which of the functions whose graphs are shown below are **even**, which are **odd**, and which are **neither** even nor odd? Which of the functions are **one-to-one** and which are not?



20. Each of exercises, (a) and (b), gives a formula for a function $y = f(x)$ and shows the graphs of f and f^{-1} . Find a formula for f^{-1} in each case. Identify the domain and range of f^{-1} .

(a) $f(x) = x^2 + 1, \quad x \geq 0$

(b) $f(x) = x^3 - 1$



21. Solve for x :

(a) $x^{1/3} = 2$ (b) $x^3 = 1/27$ (c) $\sqrt{x-1} = 5$ (d) $3x^2 - 2x = 6 + x$ (e) $x^2 - 4x + 7 = 0$
(f) $\frac{2x(x-2) - (x^2-3)}{(x-2)^2} = 0$ (g) $\sqrt{x^2+1} - \frac{x^2}{\sqrt{x^2+1}} = \frac{1}{2}$

22. Solve the following inequalities.

(a) $1 - x \leq 3$, (b) $-x^2 + 2x + 8 \leq 0$ (c) $\frac{(x+3)(x-1)}{x-2} \geq 0$

23. In each exercise, sketch the given curves together in the same coordinate plane and label each curve with its equation.

(a) $y = 2^x$, $y = 3^x$, $y = (1/2)^x$ (b) $y = e^x$ and $y = 1/e^x$

24. Use the laws of exponents to simplify the expressions.

(a) $9^{1/3} \cdot 9^{1/6}$ (b) $(25^{1/8})^4$ (c) $(e^{\sqrt{2}})^{\sqrt{2}/2}$

25. Express the following logarithms in terms of $\ln 2$ and $\ln 3$.

(a) $\ln 0.75$ (b) $\ln(4/9)$ (c) $\ln(1/2)$ (d) $\ln \sqrt[3]{9}$ (e) $\ln 3\sqrt{2}$ (f) $\ln \sqrt{13.5}$

26. Use the properties of logarithms to simplify the expressions.

(a) $\ln(\sin \theta) - \ln\left(\frac{\sin \theta}{5}\right)$ (b) $\ln(3x^2 - 9x) + \ln\left(\frac{1}{3x}\right)$ (c) $\frac{1}{2} \ln(4t^4) - \ln 2$

27. Find simpler expressions for the quantities.

(a) $e^{\ln 7.2}$ (b) $e^{-\ln x^2}$ (c) $e^{\ln x - \ln y}$
(d) $2 \ln \sqrt{e}$ (e) $\ln(\ln e^e)$ (f) $\ln(e^{-x^2-y^2})$

28. Solve for y in terms of t or x , as appropriate.

(a) $\ln y = 2t + 4$ (b) $\ln(y-1) - \ln 2 = x + \ln x$ (c) $\ln(y^2 - 1) - \ln(y+1) = \ln(\sin x)$

29. Solve for t .

(a) $e^{-0.3t} = 27$ (b) $e^{kt} = \frac{1}{2}$ (c) $e^{(\ln 0.2)t} = 0.4$ (d) $e^{\sqrt{t}} = x^2$