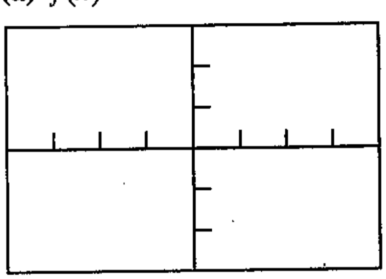
1.2–1.6 Concepts Worksheet

Graphical Analysis

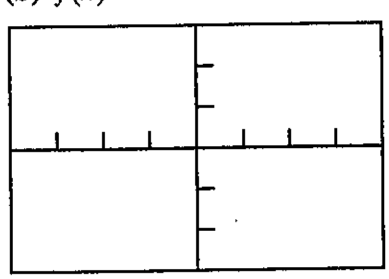
Chapter 1 deals with functions and their graphical characteristics. To facilitate a study of functions, it is important to visualize mentally the graph of function when given an algebraic description.

1. Graph each function. Clearly indicate units on the axes provided.

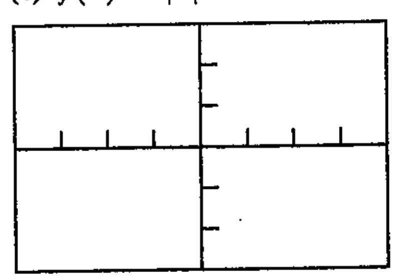
(a) $f(x) = x^2$



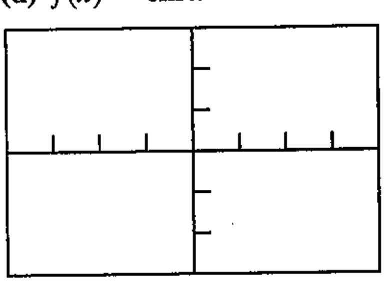
(b) $f(x) = x^3$



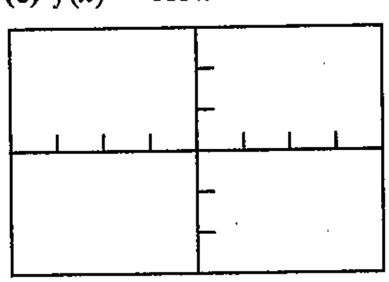
(c) $f(x) = |x|$



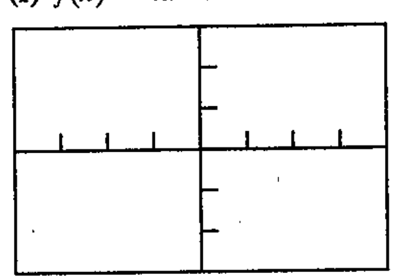
(d) $f(x) = \sin x$



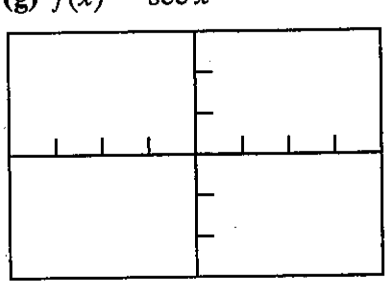
(e) $f(x) = \cos x$



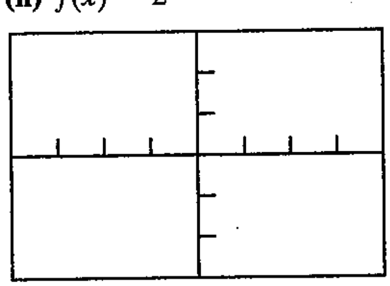
(f) $f(x) = \tan x$



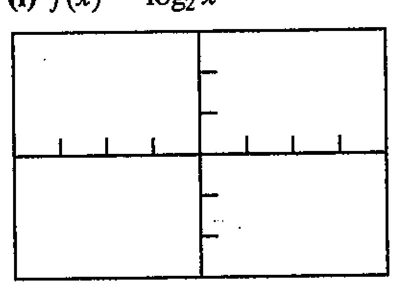
(g) $f(x) = \sec x$



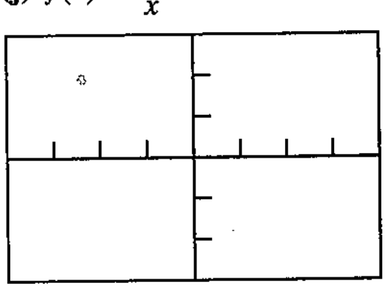
(h) $f(x) = 2^x$



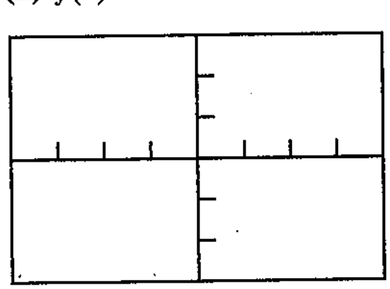
(i) $f(x) = \log_2 x$



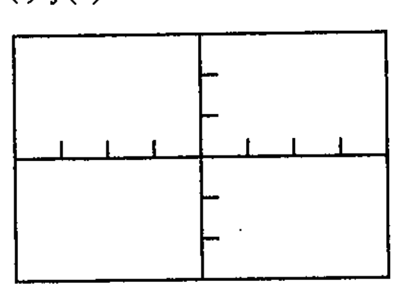
(j) $f(x) = \dfrac{1}{x}$



(k) $f(x) = \sqrt{x}$



(l) $f(x) = \sqrt{a^2 - x^2}$



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2. Answer the following questions about the indicated functions. In completing the table below, you may use the following abbreviations, R: the set of real numbers, J: the set of integers, and N: the set of natural numbers. Note: This exercise may need to be done as appropriate sections of Chapter 1 are completed.

Function	Domain	Range $y = f(x)$	Zeros (Find x when $f(x) = 0$)	Symmetry with respect to y-axis or origin	Even or Odd Function— $f(-x) = f(x)$ or $f(-x) = -f(x)$	Is the function periodic? If so, state the period.	Is $f(x)$ a one-to-one function? (For each $f(x)$ only one x exists)
(a) $f(x) = x^2$							
(b) $f(x) = x^3$							
(c) $f(x) = \|x\|$							
(d) $f(x) = \sin x$							
(e) $f(x) = \cos x$							
(f) $f(x) = \tan x$							
(g) $f(x) = \sec x$							
(h) $f(x) = 2^x$							
(i) $f(x) = \log_2 x$							
(j) $f(x) = \frac{1}{x}$							
(k) $f(x) = \sqrt{x}$							
(l) $f(x) = \sqrt{a^2 - x^2}$							

1.2–1.6 Concepts Worksheet

NAME ______________________

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Concept Connectors

3. Is there a relationship between symmetry in a function's graph and the function's being even or odd? Explain.

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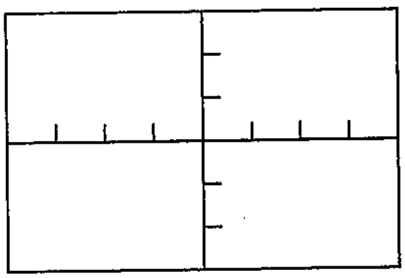
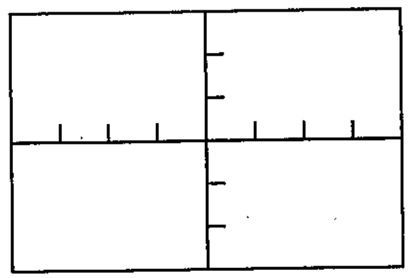
4. Draw a reflection of **(a)** $f(x) = \cos x$, **(b)** $f(x) = 2^x$ and **(c)** $f(x) = \sqrt{x - 1}$ through the x-axis.

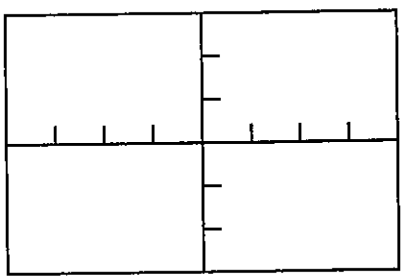
(a)



(b)

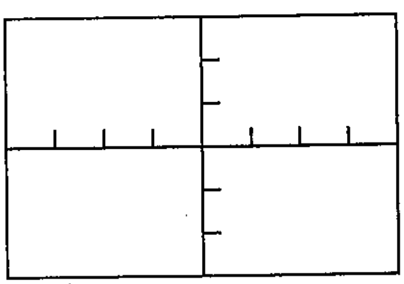


(c)

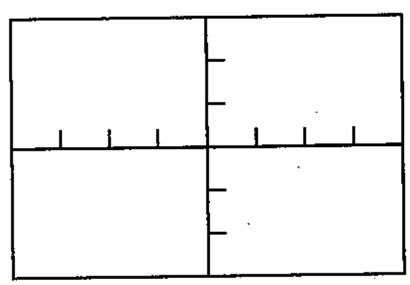


5. Draw a reflection of **(a)** $f(x) = \cos x$, **(b)** $f(x) = 2^x$ and **(c)** $f(x) = \sqrt{x - 1}$ through the y-axis.

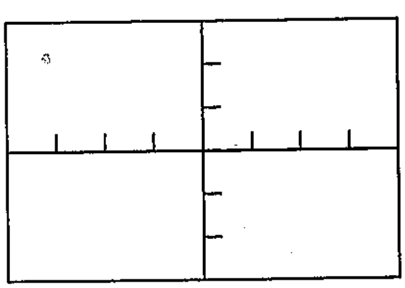
(a)



(b)



(c)



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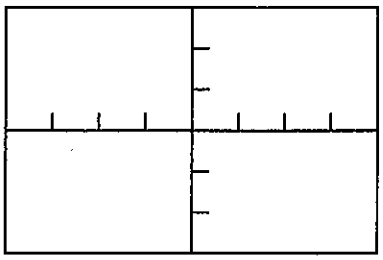
1.4 Concepts Worksheet

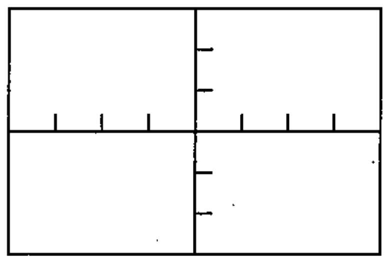
Parametric Equations

The mention of the curve $y = x^2$ should summon an immediate mental image of a parabola on the coordinate plane. The following parametric curve descriptions are related to the curve $y = x^2$, but perhaps do not evoke a mental image as quickly. Graph the following curves indicating direction for increasing values of t in the domain of each curve. Also indicate the value(s) of t corresponding to the domain endpoints and the point corresponding to $t = 0$, if any.

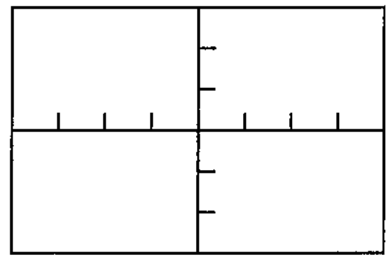
1. $x = t, y = t^2$



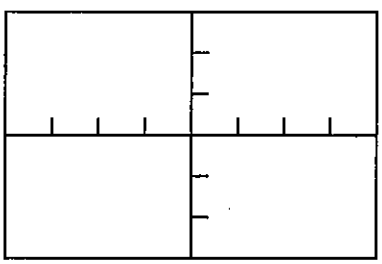
2. $x = -t, y = t^2$



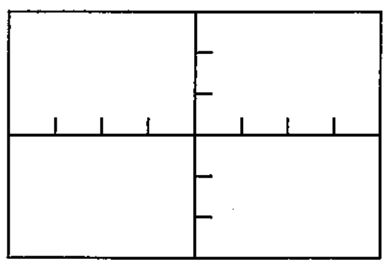
3. $x = t^2, y = t$



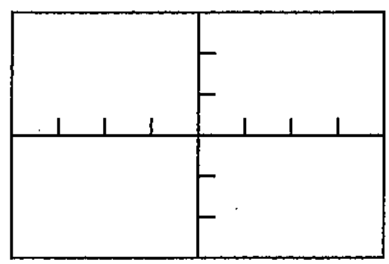
4. $x = t^2, y = t^4$



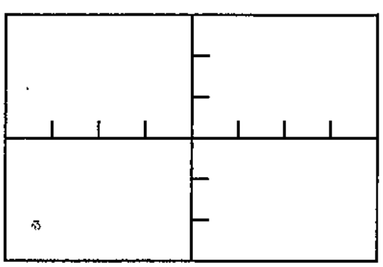
5. $x = \sin t, y = 1 - \cos^2 t$



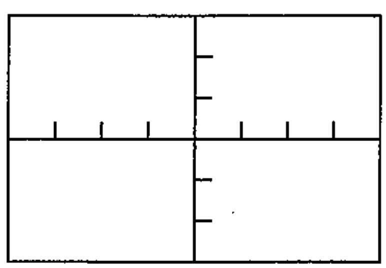
6. $x = \sec t, y = \sec^2 t$ where $0 \geq t \geq \pi, t \neq \frac{\pi}{2}$



7. $x = t^2, y = |t|$



8. $x = e^t, y = e^{2t}$



9. $x = \frac{1}{t}, y = \frac{1}{t^2}, t \neq 0$