DATE

NAME

1.2–1.6 Concepts Worksheet

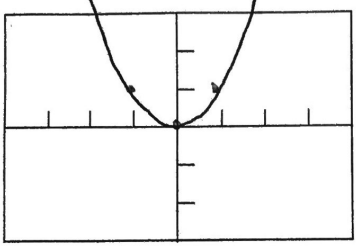
Note: Put your calculator in Radian Mode to graph the trig functions.

Graphical Analysis

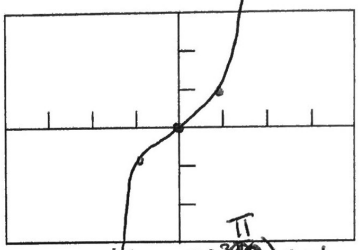
Chapter 1 deals with functions and their graphical characteristics. To facilitate a study of functions, it is important to visualize mentally the graph of a function when given an algebraic description.

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

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

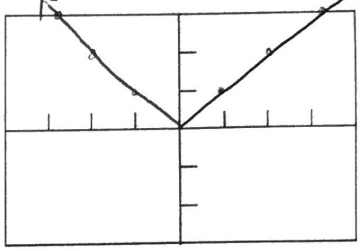


(b) $f(x) = x^3$ cubic

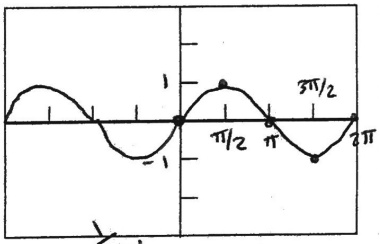


$\cos(0) = 1$
$\cos(\pi/2) = 0$
$\cos(\pi) = -1$
$\cos(2\pi) = 0$
$\cos(3\pi/2) = 0$
cosine

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

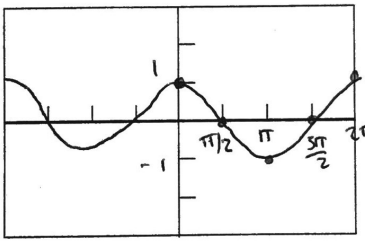


(d) $f(x) = \sin x$ sine

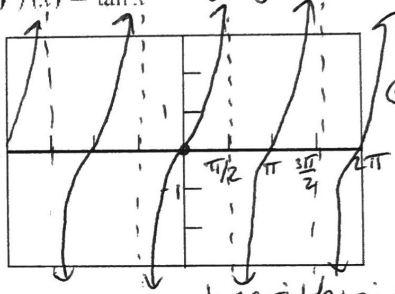


$\sin(0) = 0$
$\sin(\pi/2) = 1$
$\sin(\pi) = 0$
$\sin(3\pi/2) = -1$
$\sin(2\pi) = 0$

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



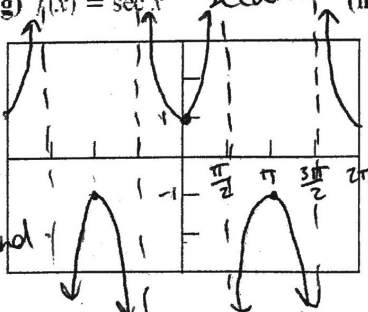
(f) $f(x) = \tan x$ tangent



asymptotes @ $x = \pi/2, 3\pi/2, \ldots$

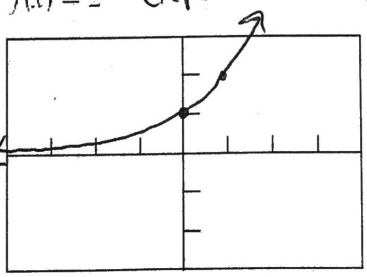
$= \frac{1}{\cos x}$

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

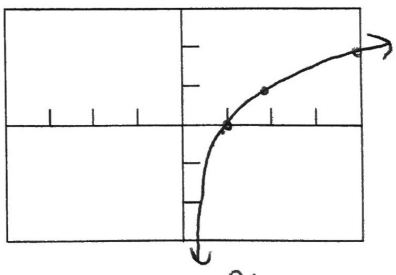


$\sec(0) = \frac{1}{\cos(0)} = 1$
$\sec(\pi/2) = \frac{1}{\cos(\frac{\pi}{2})} = \text{und}$
$\sec(\pi) = \frac{1}{\cos(\pi)} = -1$
$\sec(\frac{3\pi}{2}) = \frac{1}{\cos(\frac{3\pi}{2})} = \text{und}$

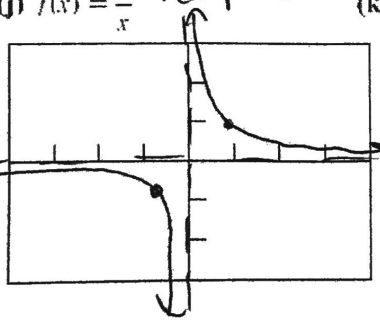
(h) $f(x) = 2^x$ exponential



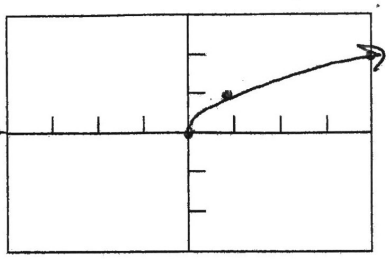
(i) $f(x) = \log_2 x$ logarithmic



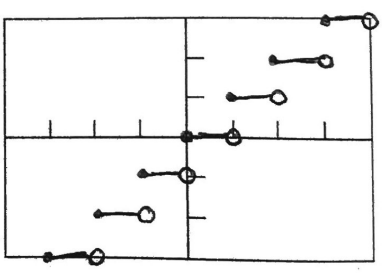
(j) $f(x) = \frac{1}{x}$ reciprocal



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



(l) $f(x) = \lfloor x \rfloor$ floor



1.2–1.6 Concepts Worksheet NAME

Continued

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) (HLT)
(a) $f(x) = x^2$	$\mathbb{R}$	$y \geq 0$	$x = 0$	y-axis	even	no	no
(b) $f(x) = x^3$	$\mathbb{R}$	$\mathbb{R}$	$x = 0$	origin	odd	no	yes
(c) $f(x) = \lvert x \rvert$	$\mathbb{R}$	$y \geq 0$	$x = 0$	y-axis	even	no	no
(d) $f(x) = \sin x$	$\mathbb{R}$	$-1 \leq y \leq 1$	$x = 0, \pi, 2\pi, \ldots$	origin	odd	yes; 2π	no
(e) $f(x) = \cos x$	$\mathbb{R}$	$-1 \leq y \leq 1$	$x = \pi/2, 3\pi/2, \ldots$	y-axis	even	yes; 2π	no
(f) $f(x) = \tan x$	$x \neq \pi/2, 3\pi/2, \ldots$	$\mathbb{R}$	$x = 0, \pi, 2\pi, \ldots$	origin	odd	yes; π	no *
(g) $f(x) = \sec x$	$x \neq \pi/2, 3\pi/2, \ldots$	$(-\infty, -1] \cup [1, \infty)$	none	y-axis	even	yes; 2π	no
(h) $f(x) = 2^x$	$\mathbb{R}$	$y > 0$	none	none	neither	no	yes
(i) $f(x) = \log_2 x$	$x \geq 0$	$\mathbb{R}$	$x = 1$	none	neither	no	yes
(j) $f(x) = \frac{1}{x}$	$x \neq 0$	$y \neq 0$	none	origin	odd	no	yes
(k) $f(x) = \sqrt{x}$	$x \geq 0$	$y \geq 0$	$x = 0$	none	neither	no	yes
(l) $f(x) = \lfloor x \rfloor$	$\mathbb{R}$	$y \in \mathbb{Z}$	$0 \leq x < 1$	none	neither	no	no

* yes if domain is restricted $(-\pi/2, \pi/2)$