C Diagnostic Test: Functions



FIGURE FOR PROBLEM 1

- **1.** The graph of a function f is given at the left.
 - (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.
- **2.** If $f(x) = x^3$, evaluate the difference quotient $\frac{f(2+h) f(2)}{h}$ and simplify your answer.
- **3.** Find the domain of the function.

(a)
$$f(x) = \frac{2x+1}{x^2+x-2}$$
 (b) $g(x) = \frac{\sqrt[3]{x}}{x^2+1}$ (c) $h(x) = \sqrt{4-x} + \sqrt{x^2-1}$

- 4. How are graphs of the functions obtained from the graph of f? (a) y = -f(x) (b) y = 2f(x) - 1 (c) y = f(x - 3) + 2
- 5. Without using a calculator, make a rough sketch of the graph.

	(a) $y = x^3$	(b) $y = (x + x)$	$(1)^{3}$	(c) $y = (x - 2)^3 + 3$
	(d) $y = 4 - x^2$	(e) $y = \sqrt{x}$		(f) $y = 2\sqrt{x}$
	(g) $y = -2^x$	(h) $y = 1 +$	x^{-1}	
6.	Let $f(x) = \begin{cases} 1 - x^2 \\ 2x + 1 \end{cases}$ (a) Evaluate $f(-2)$ and	$if x \le 0$ if $x > 0$ and $f(1)$. (b)	Sketch the grap	ph of <i>f</i> .

7. If $f(x) = x^2 + 2x - 1$ and g(x) = 2x - 3, find each of the following functions. (a) $f \circ g$ (b) $g \circ f$ (c) $g \circ g \circ g$

ANSWERS TO DIAGNOSTIC TEST C: FUNCTIONS

- **1.** (a) -2 (b) 2.8 (c) -3, 1 (d) -2.5, 0.3(e) [-3, 3], [-2, 3]
- **2.** $12 + 6h + h^2$
- **3.** (a) $(-\infty, -2) \cup (-2, 1) \cup (1, \infty)$ (b) $(-\infty, \infty)$
 - (c) $(-\infty, -1] \cup [1, 4]$
- **4.** (a) Reflect about the *x*-axis
 - (b) Stretch vertically by a factor of 2, then shift 1 unit downward
 - (c) Shift 3 units to the right and 2 units upward





If you had difficulty with these problems, you should look at sections 1.1–1.3 of this book.

Diagnostic Test: Trigonometry

- **1.** Convert from degrees to radians. (a) 300° (b) -18°
- **2.** Convert from radians to degrees. (a) $5\pi/6$ (b) 2
- **3.** Find the length of an arc of a circle with radius 12 cm if the arc subtends a central angle of 30°.
- 4. Find the exact values. (a) $\tan(\pi/3)$ (b) $\sin(7\pi/6)$ (c) $\sec(5\pi/3)$
- **5.** Express the lengths *a* and *b* in the figure in terms of θ .
- 6. If $\sin x = \frac{1}{3}$ and $\sec y = \frac{5}{4}$, where x and y lie between 0 and $\pi/2$, evaluate $\sin(x + y)$.
- 7. Prove the identities.

(a)
$$\tan \theta \sin \theta + \cos \theta = \sec \theta$$
 (b) $\frac{2 \tan x}{1 + \tan^2 x} = \sin 2x$

- **8.** Find all values of x such that $\sin 2x = \sin x$ and $0 \le x \le 2\pi$.
- **9.** Sketch the graph of the function $y = 1 + \sin 2x$ without using a calculator.

ANSWERS TO DIAGNOSTIC TEST D: TRIGONOMETRY

1. (a) $5\pi/3$	(b) $-\pi/10$	6. $\frac{1}{15}(4 + 6\sqrt{2})$
2. (a) 150°	(b) $360^{\circ}/\pi \approx 114.6^{\circ}$	8. 0, $\pi/3$, π , $5\pi/3$, 2π
3. 2π cm		9. ^y ↑
4. (a) $\sqrt{3}$	(b) $-\frac{1}{2}$ (c) 2	
5. (a) 24 $\sin \theta$	(b) $24\cos\theta$	$\begin{array}{c c} & & & \\ \hline \\ \hline$

If you had difficulty with these problems, you should look at Appendix D of this book.



FIGURE FOR PROBLEM 5