Name_____ Date_____ Period_____

Worksheet P.5—Domain, Range, and Symmetry

Show all work. No Calculator

1. Find the *x*- and *y*-intercepts and domain, then sketch the graph and find the range.

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

(b) $g(x)=\sqrt{4-x^2}$

(c) $f(t)=\dfrac{|t-3|}{t-3}$

(d) $h(m)=\begin{cases}(m-1)^2, & m\ge 1\\ 3m-3, & m<1\end{cases}$

2. Sketch the following piecewise functions, then find the domain and range of each.

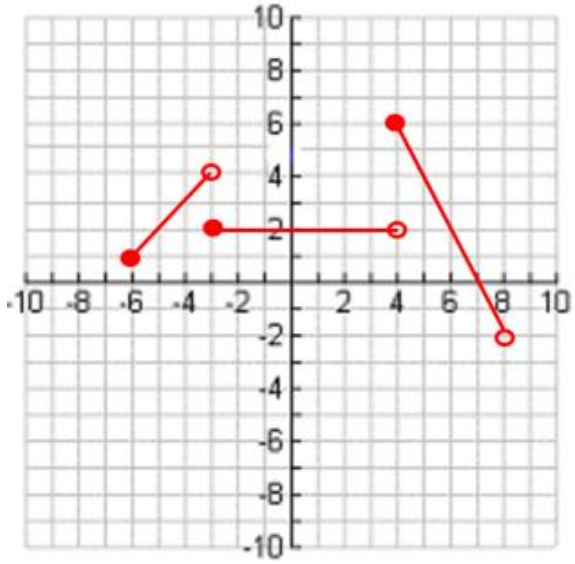
(a) $f(x)=\begin{cases}3-x, & x\le 1\\ 2x, & 1<x\end{cases}$

(b) $g(x)=\begin{cases}2, & x<0\\ \sqrt{x}, & x\ge 0\end{cases}$

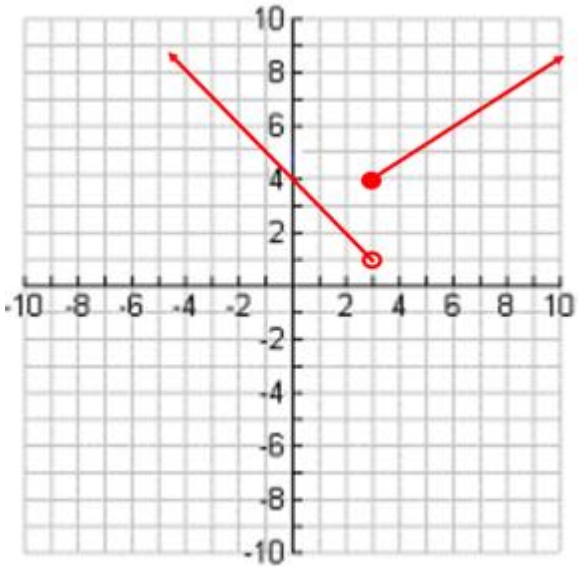
(c) $h(t)=\begin{cases}t^2, & t<0\\ t^3, & 0\le t\le 1\\ 2t-1, & t>1\end{cases}$

3. Write a piecewise function for the given graphs

(a)



(b)



Multiple Choice

_____ 4. Which of the following defines a function f for which $f(-x) = -f(x)$?

(A) $f(x) = x^2$ (B) $f(x) = \sin x$ (C) $f(x) = \cos x$ (D) $f(x) = \log x$ (E) $f(x) = e^x$

_____ 5. Which of the following equations has a graph that is symmetric with respect to the origin?

(A) $y = \dfrac{x+1}{x}$ (B) $y = -x^5 + 3x$ (C) $y = x^4 - 2x^2 + 6$ (D) $y = (x-1)^3 + 1$ (E) $y = \left(x^2 + 1\right)^2 - 1$

_____ 4. If $F(x)=x^{-2/3}(x-2)^{2/3}+x^{1/3}(x-2)^{-1/3}$, find the domain of *F*.

(A) $D_F:\{x|x\neq 0\}$ (B) $D_F:\{x|x>0\}$ (C) $D_F:\{x|0\le x\le 2\}$

(D) $D_F:\{x|x\neq 0 \text{ and } x\neq 2\}$ (E) $D_F:\{x|x \text{ is a real number}\}$

_____ 5. The domain of the function defined by $g(x)=\ln(x^2-4)$ is the set of all real numbers *x* such that

(A) $|x|<2$ (B) $|x|\le 2$ (C) $|x|>2$ (D) $|x|\ge 2$ (E) *x* is a real number

_____ 6. The graph of $y^2=x^2+9$ is symmetric to which of the following?

I. The *x*-axis
II. The *y*-axis
III. The origin

(A) I only (B) II only (C) III only (D) I and II only (E) I, II, and III

_____ 7. What is the domain of the function *f* given by $f(x)=\dfrac{\sqrt{x^2-4}}{x-3}$?

(A) $\{x:x\neq 3\}$ (B) $\{x:|x|\le 2\}$ (C) $\{x:|x|\ge 2\}$

(D) $\{x:|x|\ge 2 \text{ and } x\neq 3\}$ (E) $\{x:x\ge 2 \text{ and } x\neq 3\}$

_____ 8. Let *f* and *g* be odd functions. If *p*, *r*, and *s* are nonzero functions defined as follows, which must be odd?

I. $p(x) = f(g(x))$

II. $r(x) = f(x) + g(x)$

III. $s(x) = f(x)g(x)$

(A) I only (B) II only (C) I and II only (D) II and III only (E) I, II, and III

_____ 9. If the function *f* is continuous for all real numbers and if $f(x) = \dfrac{x^2 - 4}{x + 2}$ when $x \neq -2$, then $f(-2) =$

(A) -4 (B) -2 (C) -1 (D) 0 (E) 2

_____ 10. Let *f* be the function defined by $f(x) = \begin{cases} x^3 & \text{for } x \leq 0, \\ x & \text{for } x > 0. \end{cases}$ Which of the following statements about *f* is true?

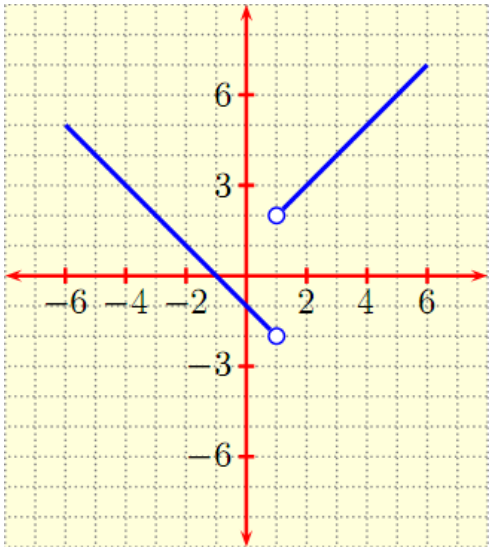
(A) *f* is an odd function (B) There is a break in the graph of *f* at $x = 0$ (C) *f* has no *x*-intercepts
(D) *f* is monotonic increasing (E) $f(|x|) = |x|$

_____ 11. Find the domain of the function $f(x)=\dfrac{\sqrt{x+1}}{x-5}$.

(A) $D_f:\{x|x\geq 1\}$ (B) $D_f:\{x|x<1,\ x\neq -5\}$ (C) $D_f:\{x|x\leq -1,\ x\neq -5\}$

(D) $D_f:\{x|x>-1,\ x\neq -5\}$ (E) $D_f:\{x|x\leq 1\}$ (F) $D_f:\{x|x\geq -1,\ x\neq -5\}$

_____ 12. Which of the following functions has the following graph of $x\in[-6,6]$, $x\neq 1$



(A) $f(x)=-\dfrac{x^2-1}{|x+1|}$

(B) $f(x)=\dfrac{|x^2-1|}{x-1}$

(C) $f(x)=-\dfrac{|x^2-1|}{x-1}$

(D) $f(x)=\dfrac{x^2-1}{|x+1|}$

(E) $f(x)=\dfrac{x^2-1}{|x-1|}$

(F) $f(x)=-\dfrac{x^2-1}{|x-1|}$

_____ 13. Which of the following gives the domain of $f(x)=\dfrac{x}{\sqrt{9-x^2}}$?

(A) $x\neq\pm 3$ (B) $(-3,3)$ (C) $[-3,3]$ (D) $(-\infty,-3)\cup(3,\infty)$ (E) $(3,\infty)$

_____ 14. Which of the following gives the range of $f(x)=1+\frac{1}{x-1}$?

(A) $(-\infty,1)\cup(1,\infty)$ (B) $y\neq 1$ (C) all real numbers (D) $(-\infty,0)\cup(0,\infty)$ (E) $y\neq 0$

_____ 15. Which of the following gives the range of $y=4-2^{-x}$?

(A) $(-\infty,2)$ (B) $(-\infty,4)$ (C) $[-4,\infty)$ (D) $(-\infty,4]$ (E) all reals

_____ 16. Which of the following gives the domain of $f(x)=3-\ln(x+2)$?

(A) $x\neq 2$ (B) $(-\infty,\infty)$ (C) $(-2,\infty)$ (D) $[-1.9,\infty)$ (E) $(0,\infty)$

_____ 17. The domain of the function $f(x)=\ln\left(x^2-x-6\right)$ is the set of all real numbers *x* such that

(A) $x>0$ (B) $-2\le x\le 3$ (C) $x\ge -2$ or $x\ge 3$ (D) $x<-2$ or $x>3$ (E) $-2<x<3$

_____ 18. The domain of $y=\sqrt{(x-1)(x-2)}$ is

(A) $|x|<2$ (B) $(1,2)$ (C) $|x|>2$ (D) $(-\infty,1]\cup[2,\infty)$ (E) $[1,2]$