Name_____ Date_____ Period_____

Worksheet 2.1—Algebraic Domains of Functions

Show all work on a separate sheet of paper. Give simplified, exact values for all answers. **No Calculator is Permitted.**

I. Multiple Choice

1. If $f(x)=\dfrac{\sqrt{x-1}}{x^2-9}$, then the domain of f is given by the interval

(A) $(1,\infty)$ (B) $(-3,3)$ (C) $[1,3)\cup(3,\infty)$ (D) $(-3,3)\cup(3,\infty)$ (E) $[1,3)$

2. Which of the following functions has no vertical asymptote(s)?

(A) $f(x)=\dfrac{x-7}{(x-7)(x-5)}$ (B) $f(x)=\dfrac{x}{x^2-x-1}$ (C) $f(x)=\dfrac{1}{x-2}$

(D) $f(x)=\dfrac{x^2-9x+20}{(x-4)(x-5)}$ (E) None, they all have at least one VA

3. Which of the following functions has a hole at $(1,4)$?

(A) $f(x)=\dfrac{x-1}{(x-1)(x-5)}$ (B) $f(x)=\dfrac{x-1}{(x+1)^2}$ (C) $f(x)=\dfrac{4}{x-1}$

(D) $\dfrac{(x-1)(11x+1)}{(x-1)(x+2)}$ (E) $f(x)=\begin{cases}x^2+3, & x\le 1\\ x+4, & x>1\end{cases}$

3. Which of the following equations represents y as a function of x?

(A) $x^2+3y=5$ (B) $y=x^2-7x+y^2$ (C) $x^2-y^3-9=0$ (D) $|x|-|y|=0$ (E) None of these

4. Which set of ordered pairs represents a function?

(A) $\{(a,3),(b,5),(c,9),(d,\ )\}$ (B) $\{(a,-3),(b,6),(c,1),(b,9)\}$ (C) $\{(a,3),(b,3),(c,3),(b,-3)\}$

(D) $\{(a,5),(a,-9),(a,0),(a,12)\}$ (E) $\{(a,3),(b,5),(c,9),(d,9)\}$

II. Short Answer

5. Find the domains of the following functions. Use correct notation.

a) $f(x)=\dfrac{1}{\sqrt{x^2-4}}$ b) $g(x)=\dfrac{3x}{x^2+4x+3}$ c) $h(x)=\sqrt{x^2+5x-6}$ d) $k(x)=\dfrac{2}{\sqrt{(x-2)^2}}$

e) $j(x)=\dfrac{-1}{1-\sqrt{x+2}}$ f) $k(x)=\dfrac{4x-1}{\left(x^2+3\right)^{1/3}}$ g) $m(x)=\dfrac{\frac{2}{x}-\frac{x}{3}}{\frac{x-5}{x}}$

5. Find all the discontinuities (if any) of the following functions, then classify them as Holes, VA's, or Jumps.

a) $f(x)=\dfrac{x-1}{x^3-x}$ b) $f(x)=\dfrac{x-5}{x^2+25}$ c) $f(x)=\dfrac{3x-6}{|x-2|}$ d) $f(x)=\dfrac{3x^2-3x-18}{4x^2-36}$

e) $f(x)=\begin{cases}x^2, & x\neq 3\\ 9, & x=3\end{cases}$ f) $f(x)=\begin{cases}x^2, & x\neq 3\\ -9, & x=3\end{cases}$ g) $f(x)=\begin{cases}x^2, & x<3\\ 5x-6, & x\geq 3\end{cases}$

h) $f(x)=\begin{cases}x^2, & x<3\\ 3x, & x>3\end{cases}$ i) $f(x)=\begin{cases}x^2, & x<3\\ 7 & \\ 3x-1, & x>3\end{cases}$ j) $f(x)=\begin{cases}\dfrac{1}{x}, & x<1\\ \dfrac{x-3}{x^2+x-12}, & x>1\end{cases}$