3.1 Practice Problems

1. Find the domain and range given the set of points. $\{(2,4),(4,-2),(5,8),(-4,7),(7,-8)\}$

domain = $\{2,4,5,-4,7\}$

range = $\{4,-2,8,7,-8\}$

2. Determine if the relation given in #1 is a function.

yes

3. Determine if the following equations represent functions.

a. $y=x^2+4$

yes

b. $y=|x+4|$

yes

c. $x^2+y^2=16$

$-x^2 \quad -x^2$

$y^2=16-x^2$

$\sqrt{y^2}=\sqrt{16-x^2}$

$y=\pm\sqrt{16-x^2}$

no

4. Let $f(x)=x^2+3x-5$ and find the following.

a. $f(5)$

$f(5)=5^2+3(5)-5$

$=25+15-5$

$=40-5$

$=35$

b. $f(-2)$

$f(-2)=(-2)^2+3(-2)-5$

$=4-6-5$

$=-2-5$

$=-7$

c. $f(a+5)$

$f(a+5)=(a+5)^2+3(a+5)-5$

$=a^2+10a+25+3a+15-5$

$=a^2+13a+20$

d. $f(-x)$

$f(-x)=(-x)^2+3(-x)-5$

$=x^2-3x-5$

e) $\dfrac{f(x+h)-f(x)}{h}$

$=\dfrac{(x+h)^2+3(x+h)-5-(x^2+3x-5)}{h}$

$=\dfrac{x^2+2xh+h^2+3x+3h-5-x^2-3x+5}{h}$

$=\dfrac{2xh+h^2+3h}{h} \quad =2x+h+3$

5. Find the domain of the following functions.

a. $f(x)=2x^2-3x+9$

All real numbers

or

$(-\infty,\infty)$

b. $g(x)=\frac{2x+3}{x-2}$

$\{x \mid x \neq 2\}$

or

$(-\infty,2)\cup(2,\infty)$

c. $h(x)=\sqrt{x+5}$

$\{x \mid x \geq -5\}$

or

$[-5,\infty)$

d. $g(x)=\frac{\sqrt{x+1}}{x-9}$

$\{x \mid x \geq -1 \text{ and } x \neq 9\}$

or

$[-1,9)\cup(9,\infty)$

e. $h(x)=\frac{3}{x^2-3x-4}$

$\{x \mid x \neq 4 \text{ and } x \neq -1\}$

or

$(-\infty,-1)\cup(-1,4)\cup(4,\infty)$

f. $f(x)=\sqrt{2-3x}$

$\{x \mid x \leq \frac{2}{3}\}$

or

$(-\infty,\frac{2}{3}]$

6. Find $f+g$, $f-g$, fg, and $\frac{f}{g}$ if $f(x)=x^2-25$ and $g(x)=x^2+2x-15$. Determine the domain for each function.

$D_f=(-\infty,\infty)$ $D_g=(-\infty,\infty)$

$(f+g)(x)=f(x)+g(x)=x^2-25+x^2+2x-15=2x^2+2x-35$

$D_{f+g}=(-\infty,\infty)$

$(f-g)(x)=f(x)+g(x)=x^2-25-(x^2-2x-15)=x^2-25-x^2-2x+15=-2x-10$

$D_{f-g}=(-\infty,\infty)$

$(fg)(x)=f(x)g(x)=(x^2-25)(x^2+2x-15)=x^4+2x^3-15x^2-25x^2-50x+375$

$=x^2+2x^3-40x^2-50x+375$

$D_{fg}=(-\infty,\infty)$

$\left(\frac{f}{g}\right)(x)=\frac{f(x)}{g(x)}=\frac{x^2-25}{x^2+2x-15}=\frac{(x+5)(x-5)}{(x+5)(x-3)}=\frac{x-5}{x-3}$

$D_{\frac{f}{g}}=(-\infty,-5)\cup(-5,3)\cup(3,\infty)$