## PRECALCULUS HANDOUT
Domain

State the domain and range of #1-4. State the domain only of #5-18. Write your answer in interval notation when appropriate.
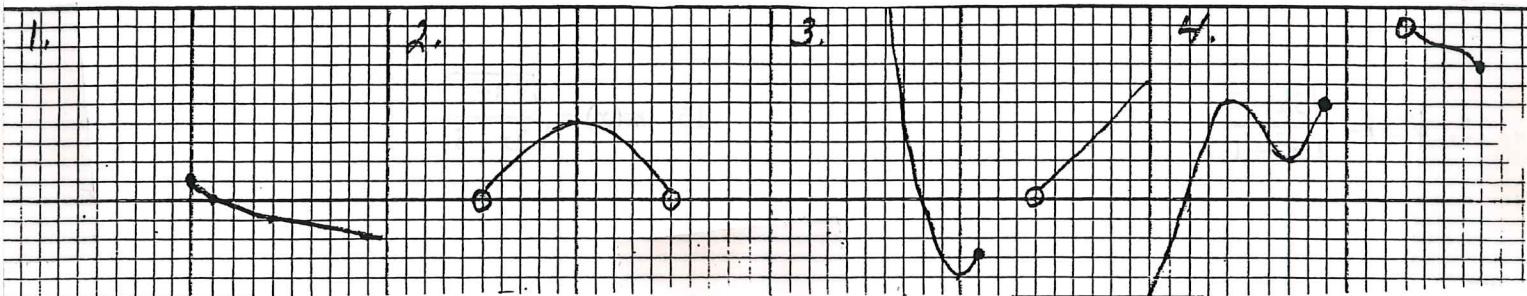
5. $f(x) = \sqrt{x+4}$

6. $g(x) = \dfrac{x+6}{x^2 - 3x - 40}$

7. $h(x) = 4x^5 - 3x^4 + 2x^2 + 5x - 8$

8. $k(x) = \sqrt{x^2 + 2x - 8}$

9. $m(x) = \dfrac{3x+1}{|x|-4}$

10. $p(x) = \dfrac{2x}{[x]-1}$

11. $k(x) = \sqrt{4-3x}$

12. $p(x) = \sqrt{x^2 - 3x - 28}$

13. $f(x) = \dfrac{x-3}{x^2-8x+15}$

14. $r(x) = \dfrac{x+2}{\sqrt{7-x^2}}$

15. $d(x) = \sqrt[3]{\dfrac{5x-7}{x^2+1}}$

16. $m(x) = \sqrt{\dfrac{3x}{2x-5}}$

17. $v(x) = \dfrac{\sqrt[4]{x^2-49}}{x+9}$

18. $z(x) = \sqrt{\dfrac{7-x}{\sqrt{x+4}}}$

ANSWERS

1. $D: [0,\infty) \quad R: (-\infty,1]$

2. $D: (-5,5) \quad R: (0,4]$

3. $D: (-\infty,1] \cup (4,\infty)$
   $R: (-4,\infty)$

4. $D: (-\infty,-1] \cup (3,7]$
   $R: (-\infty,5] \cup [7,9)$

5. $[-4,\infty)$

6. $x \neq -5,\ 8$

7. $\Re$

8. $(-\infty,-4] \cup [2,\infty)$

9. $x \neq -4,\ 4$

10. $[0,1) \cup (1,\infty)$

11. $\left(-\infty, \dfrac{4}{3}\right]$

12. $(-\infty,-4] \cup [7,\infty)$

13. $x \neq 3,\ 5$

14. $\left(-\sqrt{7}, \sqrt{7}\right)$

15. $(-\infty,\infty)$

16. $(-\infty,0] \cup \left(\dfrac{5}{2},\infty\right)$

17. $(-\infty,-9) \cup (-9,-7] \cup [7,\infty)$

18. $(-4,7]$

PRECALCULUS HANDOUT
Functions Operations & Domain

Name_____

Given the following functions, perform each operation to create a new function, and then state the domain of the new function. Write out the domain of each individual function before beginning. *Remember to consider the domains of the original functions when stating the domain of the new function!*

$$f(x) = \sqrt{x+2} \qquad g(x) = x^2 - 4 \qquad h(x) = \frac{3x}{x+2} \qquad k(x) = \frac{1}{x^2-4} \qquad m(x) = \sqrt{9-x^2}$$

Domain:

_____   _____   _____   _____   _____

1. $(g \cdot k)(x)$

2. $\left(\dfrac{h}{k}\right)(x)$

3. $\left(\dfrac{g}{h}\right)(x)$

4. $(g \circ f)(x)$

5. $(m \circ f)(x)$

6. $(h \circ h)(x)$

7. $(f \circ h)(x)$

8. $(h \circ k \circ f)(x)$

ANSWERS

Domains of original functions:

$f: [-2,\infty)$

$g: \Re$

$h: x \neq -2$

$k: x \neq -2, 2$

$m: [-3,3]$

1. $1; x \neq -2, 2$

2. $3x^2 - 6x; x \neq -2, 2$

3. $\dfrac{x^3 + 2x^2 - 4x - 8}{3x}; x \neq -2, 0$

4. $x - 2; [-2,\infty)$

5. $\sqrt{7-x}; [-2,3]$

6. $\dfrac{9x}{5x+4}; x \neq -2, -\dfrac{4}{5}$

7. $\sqrt{\dfrac{5x+4}{x+2}}; \left[-\dfrac{4}{5},\infty\right)$

8. $\dfrac{3}{2x-3}; \left(-2,\dfrac{3}{2}\right) \cup \left(\dfrac{3}{2},2\right) \cup (2,\infty)$

Assignment:
1) 3   4) 1 from each part
2) 5   5) 1
3) a-c 2 6) All!!!!
   d-i 5   7) 1

Name_____

PRECALC REVIEW
Functions

1. Express the following in interval notation.

(a) $\left(-\infty,5\right]\cup\left(2,18\right)$ (b) $\left[-11,8\right)\cap\left[7,70\right]$ (c) $x<1$ and $x\geq11$ (d) $x>-4$ or $x\leq-3$

2. Determine whether each of the following is a function.

(a) $\left\{\left(11,-2\right)\left(-5,7\right)\left(-2,-2\right)\left(8,3\right)\left(-5,-9\right)\right\}$ (b) $\left\{\left(8,-7\right)\left(-7,8\right)\left(0,0\right)\left(-4,1\right)\left(1,-4\right)\right\}$

(c) $4x=5-y^2$ (d) $5-4y=3x^2$ (e) $|y|=2x$

(f)   (g)
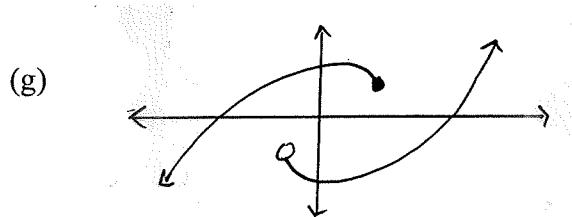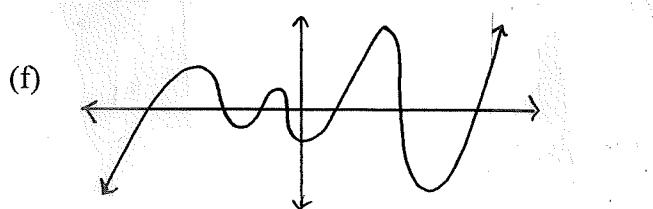
3. Give the domain and range of a-c and the domain only of d-i.
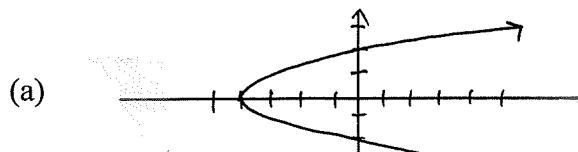
	Domain	Range
(a)	_____	_____
(b)	_____	_____
(c)	_____	_____
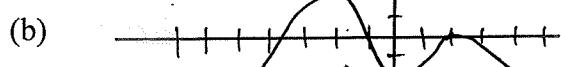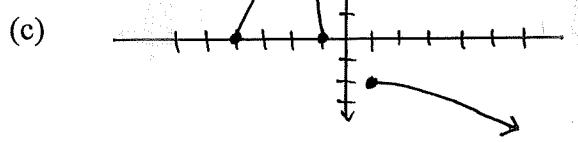
(d) $y=-\sqrt{49-x^2}$ _____

(e) $y=\dfrac{4x+7}{3x^2-x-4}$ _____

(f) $d(x) = \sqrt[3]{\dfrac{3x+1}{x^2-4}}$ _____

(g) $f(x) = \dfrac{x-4}{|3x|-2}$ _____

(h) $g(x) = \dfrac{4x-7}{\sqrt{2x^2-x-15}}$ _____

(i) $m(x) = \sqrt{\dfrac{2x-7}{4x^2-9}}$ _____

4. (a) If $f(x) = 3x^2 - 2x - 5$, find (i) $f(-4)$ (ii) $f(2t^2)$.

(b) If $h(x) = \begin{cases} 0 & \text{if } x < -1 \\ 4x^3 - 7 & \text{if } -1 \le x \le 3 \\ \dfrac{5}{x^2} & \text{if } x > 3 \end{cases}$ (i) $h\left(\dfrac{9}{2}\right)$ (ii) $h(-2)$

5. Find two functions f and g such that $(f \circ g)(x) = h(x)$.

(a) $h(x) = \sqrt[4]{x^2 - 7}$ (b) $h(x) = \dfrac{x^3}{x^3 + 7}$ (c) $h(x) = (8-x)^2 + 3(8-x) - 1$

6. Find the domain of each of the given functions. Then perform each operation, simplify the result, and state the domain of the new function.

$$f(x) = \frac{x-1}{x+1} \qquad g(x) = \frac{1}{x} \qquad h(x) = \sqrt{4-x} \qquad k(x) = x^2 - 1 \qquad m(x) = \sqrt{x^2 - 9}$$

_____ _____ _____ _____ _____

(a) $\left(\dfrac{f}{g}\right)(x)$

(b) $\left(k \circ h\right)(x)$

(c) $\left(g \circ f\right)(x)$

(d) $\left(h \circ f\right)(x)$

(e) $(m \circ h)(x)$

7. Solve the following systems of equations using matrix equations.

    (a) $8x - 5y = -157$
            $7x + 11y = 124$

    (b) $7x - 14y + 19z = -1040$
            $3x + 15y - 22z = 1031$
            $25x - 8y - 10z = -304$

ANSWERS

1. (a) $\left(-\infty, 18\right)$ (b) $\left[7, 8\right)$ (c) $\varnothing$ (d) $\left(-\infty, \infty\right)$

2. (a) no (b) yes (c) no (d) yes (e) no (f) yes (g) no

3. (a) $D: \left[-4, \infty\right)$ $R: \left(-\infty, \infty\right)$ (b) $D: \left[-5, 4\right]$ $R: \left[-3, 2\right]$ (c) $D: \left[-4, -1\right] \cup \left[1, \infty\right)$ $R: \left(-\infty, -2\right] \cup \left[0, 4\right]$

    (d) $\left[-7, 7\right]$ (e) $x \neq -1, \dfrac{4}{3}$ (f) $x \neq \pm 2$ (g) $x \neq \pm \dfrac{2}{3}$ (h) $\left(-\infty, -\dfrac{5}{2}\right) \cup \left(3, \infty\right)$ (i) $\left(-\dfrac{3}{2}, \dfrac{3}{2}\right) \cup \left[\dfrac{7}{2}, \infty\right)$

4. (a) (i) 51 (ii) $12t^4 - 4t^2 - 5$ (b) (i) $\dfrac{20}{81}$ (ii) 0

5. (a) $f(x) = \sqrt[4]{x}$; $g(x) = x^2 - 7$ (b) $f(x) = \dfrac{x}{x+7}$; $g(x) = x^3$ (c) $f(x) = x^2 + 3x - 1$; $g(x) = 8 - x$

    (Other answers are possible.)

6. Domains: $f: x \neq -1$, $g: x \neq 0$, $h: (-\infty, 4]$, $k: (-\infty, \infty)$, $m: (-\infty, -3] \cup [3, \infty)$

    (a) $\left(\dfrac{f}{g}\right)(x) = \dfrac{x^2 - x}{x+1}$ $x \neq -1, 0$ (b) $(k \circ h)(x) = 3 - x$ $(-\infty, 4]$ (c) $(g \circ f)(x) = \dfrac{x+1}{x-1}$ $x \neq -1, 0, 1$

    (d) $(h \circ f)(x) = \sqrt{\dfrac{3x+5}{x+1}}$ $\left(-\infty, -\dfrac{5}{3}\right] \cup (-1, 4]$ (e) $(m \circ h)(x) = \sqrt{-x - 5}$ $(-\infty, -5]$

7. (a) $\left(-9, 17\right)$ (b) $\left(-12, 33, -26\right)$