Answers

Advanced Algebra | Review Guide 3-8, 3-9, 3-10, 10-3 | Mrs. Dunphy

Instructions: Show all steps that lead to your solution. Check your answer on the blog.

Section 3-8

Definitions:

- **Function**
- **Domain**
- **Range**

SKILLS TO KNOW:

- Graph a function over a given domain.
- Evaluate a function at a given input, for example, find f(2) if f(x) = x + 3
- Evaluate composite functions, for example find f(g(3)) if f(x) = x + 3 and g(x) = 2x – 5.
- Determine the range of a function over a given domain.
- Determine the domain of a function by finding the places where it "blows up" (becomes undefined).

1. Given that $f(x) = -3x^2 + 10$ and $g(x) = |x-4| - 6$, find the following:

(A) $f(-2) = -2$

(B) $f(4) = -38$

(C) $f(0) = 10$

(D) $g(-6) = 4$

(E) $g(4) = -6$

(F) $g(0) = -2$

(G) $g(f(3)) = 15$

(H) $f(g(-2)) = 10$

(I) $g(g(g(-2))) = 0$

(J) $(f+g)(2) = -6$

(K) $(f-g)(3) = -12$

(L) $(f \cdot g)(-2) = 0$

(M) $(f/g)(4) = \frac{19}{3}$

(N) $f(2g(-3)) = -2$

2. Find the domain of each function.

(A) $f(x) = \sqrt{3x-2}$ (B) $g(x) = \dfrac{2}{(x-1)(x+4)}$ (C) $h(x) = \dfrac{\sqrt{3-x}}{x^2-25}$

$\{x: x \geq \frac{2}{3}\}$ $\{x: x \neq 1, -4\}$ $\{x: x \leq 3, x \neq -5\}$

(you do not need to state that $x \neq +5$)

3. Find the range of $F(x) = |1-x|$ over the domain D = {-2, -1, 0, 1, 2}

x	f(x)
-2	3
-1	2
0	1
1	0
2	1

$\{0, 1, 2, 3\}$

(no repeats)

Section 3-9

Definitions:

- **linear function**
- **constant function,**
- **rate of change**

SKILLS TO KNOW:

- Determine the equation of a linear function based on given information, for example either the slope and a point or two points.
- Evaluate functions after finding the equation of the function.
- Solve word problems by creating a linear function and evaluating it according to the problem.

1. Find an equation of the linear function f for the given information and find $f(-10)$ for each.

(A) $f(0) = 3$ and $f(x)$ decreases by 2 when x increases by 3.

$b = 3$ OR $(0, 3)$ $m = \frac{-2}{3}$

$\boxed{f(x) = -\frac{2}{3}x + 3}$

$\boxed{f(-10) = 9\frac{2}{3} \text{ OR } \frac{29}{3}}$

(B) $f(4) = -5$ and $f(-3) = 3$

$(4, -5)$ $(-3, 3)$

$\boxed{f(x) = -\frac{8}{7}x - \frac{3}{7}}$

$\boxed{f(-10) = 11}$

Section 3-10

Definitions:

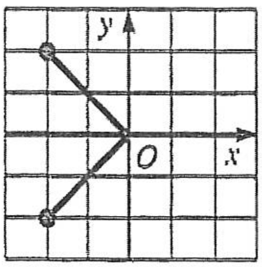
- **relation**
- **function**
- **vertical lines test**

SKILLS TO KNOW:

- Determine if a relation is a function by inspecting the ordered pairs or using the vertical line test on a graph of the function.
- Find the domain of a relation, graph it, and determine if it is a function.

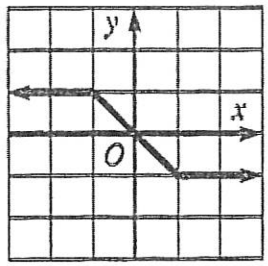
2-4: Give the domain and range of each function shown. Then state whether it is a function or not.

2.



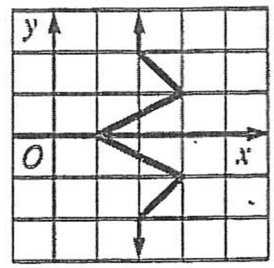
$D = \{x: -2 \le x \le 0\}$
$R = \{y: -2 \le y \le 2\}$

3.



$D = \{\text{all reals}\}$
$R = \{y: -1 \le y \le 1\}$

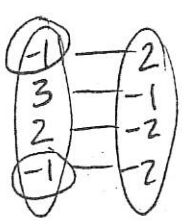
4.



$D = \{x: 1 \le x \le 3\}$
$R = \{\text{all reals}\}$

9-10: Determine if each relation is a function. If not, state why.

9. $\{(-1, 2), (3, -1), (2, -2), (-1, -2)\}$



$-1 \to 2$, $-1 \to -2$

Repeated x value!

NOT a function!

10. $\{(1, 3), (3, -1), (1, -1), (-2, -1)\}$

$1 \to 3$, $1 \to -1$

Repeated x value

NOT a function!

Section 10-3

Definitions:

Composite

Composition

Inverse function

SKILLS TO KNOW:

- Find the ***composite*** of two functions: **h(x) = f(g(x)).**
- State the meaning on inverse functions: Two functions are inverses only if f(g(x)) = x and g(f(x)) = x.
- Simple example: $f(x) = x^2$ and $g(x)=\sqrt{x}$ because $f(g(x))=\left(\sqrt{x}\right)^2=x$ *and* $g(f(x))=\sqrt{x^2}=x$.
- Find the inverse of a function, if it exists: (1) write y = f(x); (2) swap x and y; (3) solve for y; (4) replace y with $f^{-1}(x)$; (5) check the domains

1-2: Suppose $f(x)=\frac{x}{2}$, $g(x)=x-3$, *and* $h(x)=\sqrt{x}$. Find a real-number value or an expression in x for each of the following. If no real value can be found, say so.

1. a. $h(f(72))$ = 6 b. $h(f(50))$ = 5 c. $h(f(x))$ = $\sqrt{\frac{x}{2}}$ d. $f(f(x))$ = $\frac{x}{4}$

2. a. $g(h(9))$ = 0 b. $g(h(3))$ = $\sqrt{3}-3$ c. $g(h(x))$ = $\sqrt{x}-3$ d. $g(g(x))$ = $x-6$

3-5: Find the inverse of each function algebraically.

3. $f(x) = 2x - 3$

$f^{-1}(x) = \frac{x+3}{2}$

4. $g(x)=\frac{1}{x-1}$

$f^{-1}(x) = \frac{1}{x} + 1$

5. $h(x) = 2x^3 - 1$

$f^{-1}(x) = \sqrt[3]{\frac{x+1}{2}}$