Name Answer Key

PreCalculus; Sec 1.2 – Functions

1. A relation that assigns to each element $x$ from a set of inputs, or Domain, exactly one element $y$ in a set of outputs, or Range, is called a(n) function.

2. For an equation that represents $y$ as a function of $x$, the independent variable is the set of all $x$ in the domain, and the Dependent variable is the set of all $y$ in the range.

3. Can the ordered pairs $(3, 0)$ and $(3, 5)$ represent a function?

NO INPUT OF 3 has two OUTPUTS: 0 & 5

4. To find $g(x+1)$, what do you substitute for $x$ in the function $g(x) = 3x - 2$?

x+1 gets SUBSTITUTED INTO g(x).

5. Does the domain of the function $f(x) = \sqrt{1+x}$ include $x = -2$?

NO $\sqrt{1+(-2)} = \sqrt{-1}$ ← CANNOT TAKE SQUARE ROOTS of NEGATIVE NUMBERS!

**Evaluate the function at each specified value of the independent variable and simplify.**

6. $f(t) = 3t + 1$

a) $f(2)$ $= 3(2)+1$ $\boxed{=7}$

b) $f(-4)$ $= 3(-4)+1$ $\boxed{=-11}$

c) $f(t+2)$ $= 3(t+2)+1$ $\boxed{=3t+7}$

7. $f(y) = 3 - \sqrt{y}$

a) $f(4)$ $= 3-\sqrt{4}$ $\boxed{=1}$

b) $f(0.25)$ $= 3-\sqrt{0.25}$ $\boxed{=2.5}$

c) $f(4x^2)$ $= 3-\sqrt{4x^2}$ $\boxed{=3-2x}$

8. $f(x) = \sqrt{x+8} + 2$

a) $f(-4)$ $= \sqrt{-4+8}+2$ $\boxed{=4}$

b) $f(8)$ $= \sqrt{8+8}+2$ $\boxed{=6}$

c) $f(x-8)$ $= \sqrt{x-8+8}+2$ $\boxed{=\sqrt{x}+2}$

9. $f(x) = \begin{cases} 2x+5, & x \le 0 \\ 2 - x^2, & x > 0 \end{cases}$

a) $f(-2)$ $= 2(-2)+5$ $\boxed{=1}$

b) $f(0)$ $= 2(0)+5$ $\boxed{=5}$

c) $f(1)$ $= 2-(1)^2$ $\boxed{=1}$

**Find the domain of the function. Write your answer(s) in interval notation.**

10. $f(x) = 5x^2 + 2x - 1$

NO DIVISION

NO EVEN ROOTS.

D: $(-\infty, +\infty)$

$\mathbb{R}$ IN INTERVAL NOTATION

11. $g(x) = \frac{1}{x} - \frac{3}{x+2}$

$\frac{1}{x} \to x \neq 0$

$\frac{1}{x+2} \to x \neq -2$

D: $(-\infty, -2) \cup (-2, 0) \cup (0, +\infty)$

12. $h(x) = \frac{10}{x^2 - 2x} = \frac{10}{x(x-2)}$

D: $(-\infty, 0) \cup (0, 2) \cup (2, +\infty)$

13. $f(x) = \frac{\sqrt{x+6}}{6+x}$ $x > -6$, $x \neq -6$

D: $(-6, +\infty)$

**Find the difference quotient.**

14. $f(x) = 2x + 3$

$\frac{f(x+h) - f(x)}{h}$

$= \frac{[2(x+h)+3] - [2x+3]}{h}$

$= \frac{2x + 2h + 3 - 2x - 3}{h}$

$= \frac{2h}{h}$

$\boxed{= 2}$

15. $g(x) = 2x^2 - x$

$\frac{g(x+h) - g(x)}{h}$

$= \frac{[2(x+h)^2 - (x+h)] - [2x^2 - x]}{h}$

$= \frac{2x^2 + 4xh + 2h^2 - x - h - 2x^2 + x}{h}$

$= \frac{4xh + 2h^2 - h}{h}$

$\boxed{= 4x + 2h - 1}$

16. The table shows the revenue $y$ (in thousands of dollars) of a landscaping business for each month of 2010, with $x = 1$ representing January.

| Month, $x$ | Revenue, $y$ |
|---|---|
| 1 | 5.2 |
| 2 | 5.6 |
| 3 | 6.6 |
| 4 | 8.3 |
| 5 | 11.5 |
| 6 | 15.8 |
| 7 | 12.8 |
| 8 | 10.1 |
| 9 | 8.6 |
| 10 | 6.9 |
| 11 | 4.5 |
| 12 | 2.7 |

The mathematical model below represents the data.

$$f(x) = \begin{cases} -1.97x + 26.3 \\ 0.505x^2 - 1.47x + 6.3 \end{cases}$$

a. Identify the independent and dependent variables and explain what they represent in the context of the problem.

INdepeNDENT, $x$
MONTH of year 2010

dependENT, $y$
Revenue made during month $x$ of 2010

b. What is the domain of each part of the piecewise-defined function? Explain your reasoning.

$$\begin{cases} 7 \le x \le 12 \\ 1 \le x \le 6 \end{cases}$$

MONTH NUMBER AS INPUT gives THE DESIRED OUTPUT

c. Use the mathematical model to find $f(5)$. Interpret your result in the context of the problem.

$f(5) = 0.505(5)^2 - 1.47(5) + 6.3$
$\boxed{= 11.575}$

DURING MAY, The business MADE \$ 11.575 thousand in Revenue.

d. Use the mathematical model to find $f(11)$. Interpret your result in the context of the problem.

$f(11) = -1.97(11) + 26.3$
$\boxed{= 4.63}$

DURING NOVEMBER, THE business MADE \$4.63 thousand in REVENUE.

e. How do the values obtained from the models in parts (c) and (d) compare with the actual data values?

THE VALUES IN (c) AND (d) are a Little Higher than the ACTUAL VALUES.