Chapter 2.1 Check Your Understanding

Exercises 1–5 True or False. Give reasons.

1. There is no function with domain {0, 1} and range {3}.

Answer:

False; f(x) = 3 for x = 0 or x = 1.

2. There is no function with domain {1, 2} and range {3, 4, 5}.

Answer:

True; if the domain D and the Range R are finite sets, then D must contain at least as many elements as R. Otherwise it would not be possible to have each number in D correspond to exactly one number in R.

3. If $f(x) = x + 1$, then $f(\sqrt{2} + \sqrt{3}) = f(\sqrt{2}) + f(\sqrt{3})$.

Answer:

False; $f\left(\sqrt{2}+\sqrt{3}\right) = \sqrt{2}+\sqrt{3}+1$, $f\left(\sqrt{2}\right)+f\left(\sqrt{3}\right) = \sqrt{2}+\sqrt{3}+2$.

4. In interval notation, the domain of $f(x) = \dfrac{x}{\sqrt{1-x}}$ is $(-\infty, 1)$.

Answer:

True; for $f(x) = \frac{x}{\sqrt{1-x}}$ we need $1 - x > 0$ or $x < 1$, so $D = \{x | x < 1\}$.

5. If $f(u) = \dfrac{1+u}{1-u}$ then $f(-u) = \dfrac{1}{f(u)}$.

Answer:

True; $f(-u) = (1-u)/(1+u)$ and $1/f(u) = (1-u)/(1+u)$.

Exercises 6–10 Fill in the blank so that the resulting statement is true, where f(x) = 2x + 3.

6. The largest prime number less than $f(11)$ is _____.

Answer:

If f(x) = 2x + 3, then f(11) = 2(11) + 3 = 25. The largest prime number less than 25 is 23.

7. The number of primes between $f(6)$ and $f(10)$ is _____.

Answer:

$f(6) = 2(6) + 3 = 15$ and $f(10) = 2(10) + 3 = 23$ so there are two prime numbers, 17 and 19, between 15 and 23.

8. The smallest even number greater than $f(7)$ is _____.

Answer:

If $f(x) = 2x + 3$, then $f(7) = 2(7) + 3 = 17$. The smallest even number greater than 17 is 18.

9. $f(3) + f(-3) =$ _____.

Answer:

$f(3) + f(-3) = [2(3) + 3] + [2(-3) + 3] = 9 + (-3) = 6.$

10. The domain of f is _____.

Answer:

Since $2x + 3$ is defined for every real number x, then the domain of f is $\mathbb{R}$.