2.1

Functions and Domain and Range

1) If $h \neq 0$ and $f(x) = x^2 - 1$, then $\dfrac{f(x+h) - f(x)}{h} =$

A) $2x + h$

B) $2x + h + 1$

C) $2x - h - 1$

D) $2x - h$

E) $h - 2$

2) The **domain** D and the **range** R of the function $f(x) = 2 - \sqrt{6 - 3x}$ are respectively given by

A) $D = (-\infty, 2]$ and $R = (-\infty, 2]$

B) $D = (-\infty, 2]$ and $R = [2, \infty)$

C) $D = (-\infty, 2]$ and $R = [2, 6]$

D) $D = [2, \infty)$ and $R = [2, \infty)$

E) $D = [2, \infty)$ and $R = (-\infty, 2]$

3) If $f(x) = x^3 - 1$ and $h \neq 0$, then $\dfrac{f(2+h) - f(2)}{h} =$

A) $h^2 + 6h + 12$

B) $h^2 + 6h + 14$

C) h^2

D) $h^2 - \dfrac{2}{h}$

E) $h^2 + 6h$

4) Identify the set of ordered pairs (x,y) or relation that defines y as a function of x

(a) $5y+x=2y+\sqrt{x^2-5}$

(b) $(x-1)^2+(y-2)^2=25$

(c) $\{(1/2,0),(2,-1),(3,3),(1/2,1/4)\}$

(d) $|5y-1|=2x+5$

(e) $-4x^2+y^2=9$

5) The domain of $y=\dfrac{1}{\sqrt{x}-3}$ in interval notation is:

(a) $[0,9)\cup(9,\infty)$

(b) $(-\infty,9)\cup(9,\infty)$

(c) $[0,\infty)$

(d) $(3,\infty)$

(e) $(9,\infty)$

6) The domain D and the range R of the function $f(x)=\dfrac{\sqrt{4-9x^2}}{2}$ is given by

(a) $D=[-2/3,2/3];\ R=[0,1]$

(b) $D=[-2/3,2/3];\ R=(-\infty,0]$

(c) $D=[-2/3,2/3];\ R=[0,\infty)$

(d) $D=(-\infty,-2/3];\ R=[0,\infty)$

(e) $D=[2/3,\infty);\ R=[0,1)$

7) If $f(x)=\frac{2}{3}x+2$, then $f(x-3)=$

(a) $f(x)-2$

(b) $f(x)+2$

(c) $f(x)-3$

(d) $f(x)+3$

(e) $f(x)+2/3$

8) If (a,b) is the intersection point of the graphs of $f_1(x)=-3x-7$ and $f_2(x)=2x+13$, then $a+b=$

(a) 1

(b) -2

(c) 4

(d) -3

(e) 3

9) If $g(x)=5x^2-4x$, then the expression $\frac{g(x+h)-g(x)}{h}$ simplifies to

(a) $10x+5h-4$

(b) $10x+5h+4$

(c) $10x-5h+4$

(d) $5x+5h+4$

(e) $5x-5h-4$

10) The **domain**, in interval notation, of the function

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

is equal to

(a) $[2,3)\cup(3,\infty)$

11) Which one of the following statements is FALSE ?

A) The domain of the function $f(x) = -5$ is $\{-5\}$

B) The range of the relation $x = -7$ is $(-\infty, \infty)$

C) The domain and range of the function $6x - 7y = 0$ are both $(-\infty, \infty)$

D) The slope of a vertical line is undefined

E) The graph of a constant function is a horizontal line

12) Which one of the following relations DOSE NOT represent a function:

A) $y^2 = 3x + 6$

B) $x + 5y = 7$

C) $y = x^2 - 4$

D) $y = \sqrt{2x - 1}$

E) $y = \frac{3}{x-2}$

13) If $f(x) = \sqrt{7 - 3x}$, then the Domain D and the Range R , are:

A) D is $(-\infty, \frac{7}{3}]$ and R is $[0, \infty)$

14) Which one of the following relations defines y as a function of x ?

A) $y = \sqrt{2x + 1}$

B) $x = y^4$

C) $\{(1, 10), (2, 15), (3, 19), (2, 19), (5, 27)\}$

D) $x^2 + y^2 = 4$

E) $x = 5$

15) If D is the Domain of $y = \frac{5}{x-9}$ and R is the Range of $y = \sqrt{x-1}$ then:

A) $D = (-\infty, 9) \cup (9, \infty)$ and $R = [0, \infty)$

16) If D is the Domain of $y = \frac{1}{\sqrt{x-3}}$ and R is the Range of $y = x^2$ then:

A) $D = (3,\infty)$ and $R = [0,\infty)$

17) Which one of the following relations defines y as a function of x ?

A) $y^3 + 3x = 1$

B) $x^2 + 4y^2 = 1$

C) $x = |y + 2|$

D) $y = \pm\sqrt{x - 3}$

E) $\{(x, y) \mid x = 2\}$

18) The domain of the function $y = \sqrt{\frac{x^2 - 3x}{2 - x}}$ is

A) $(-\infty, 0] \cup (2, 3]$

19) The domain of the function $y = \frac{3}{\sqrt{x} - 2}$ is

A) $[0, 4) \cup (4, \infty)$

20) Which one of the following equations or the set of ordered pairs defines y as a function of x ?

A) $|5y-1|=3x$

B) $xy-y=7$

C) $x+2=y^4$

D) $\{(x, y): x=1\}$

E) $\{(-2, 4), (0, 6), (2, 5), (0, 8)\}$

21) The domain of $g(x)=\sqrt{x-x^3}$ is

A) $(-\infty, -1]\cup[0, 1]$

22) If $f(x)=\frac{1}{x+1}$, then $\frac{f(1+h)-f(1)}{h}$ is equal to

(a) $-\frac{2}{h}$

(b) $-\frac{3}{2(2+h)}$

(c) $-\frac{1}{2(2+h)}$

(d) $-\frac{2}{2+h}$

(e) $-2(2+h)$

23) If $f(x)=\sqrt{x}$, then $\frac{f(1+h)-f(1)}{h}$ is equal to

(a) $-\frac{1}{1+\sqrt{1+h}}$

(b) $\frac{1}{h}$

(c) $\frac{1}{\sqrt{1+h}-1}$

(d) $\frac{1}{1+\sqrt{1+h}}$

(e) $-\frac{1}{h}$

24) Let $h \neq 0$. If $f(x) = x^2 + 5$, then $\dfrac{f(x) - f(x - h)}{h} =$

A) $2x - h$

B) $2x + h$

C) $2x$

D) $-2x + h$

E) $2x^2 - h$

25) Which **ONE** of the following equations defines y as a function of x?

A) $|x| + y = 5$

B) $x^3 + y^2 = 1$

C) $\sqrt{y^2} - x = 5$

D) $y = 3 \pm \sqrt{x - 1}$

E) $x^2 + (y - 1)^2 = 4$

26) If the **domain**, in interval notation, of $f(x) = \sqrt{|x - 2| - 1}$ is given by $(-\infty, a] \cup [b, \infty)$, then $a + b =$

A) 4

B) 1

C) 5

D) 3

E) -1