SAT Math Level 2 Practice Test 5

Functions Definitions

1. If {(3,2),(4,2),(3,1),(7,1),(2,3)} is to be a function, which one of the following must be removed from the set?

A. (3,2)

B. (4,2)

C. (2,3)

D. (7,1)

E. none of the above

2. For $f(x) = 3x^2 + 4$, $g(x) = 2$, and $h = \{(1,1), (2,1), (3,2)\}$,

A. *f* is the only function

B. *h* is the only function

C. *f* and *g* are the only functions

D. *g* and *h* are the only functions

E. *f, g,* and *h* are all functions

3. What value(s) must be excluded from the domain of $f = \left\{(x,y): y = \frac{x+2}{x-2}\right\}$?

A. -2

B. 0

C. 2

D. 2 and -2

E. no value

Combining Functions

1. If $f(x) = 3x^2 - 2x + 4$, $f(-2)$ =

A. -12

B. -4

C. -2

D. 12

E. 20

2. If $f(x) = 4x - 5$ and $g(x) = 3^x$, then $f(g(2)) =$

A. 3

B. 9

C. 27

D. 31

E. none of the above

3. If $f(g(x)) = 4x^2 - 8x$ and $f(x) = x^2 - 4$, then $g(x) =$

A. $4 - x$

B. x

C. $2x - 2$

D. $4x$

E. x^2

4. What values must be excluded from the domain of $\left(\frac{f}{g}\right)(x)$ if $f(x) = 3x^2 - 4x + 1$ and $g(x) = 3x^2 - 3$?

A. 0

B. 1

C. 3

D. both ±1

E. no values

5. If $g(x) = 3x + 2$ and $g(f(x)) = x$, then $f(2) =$

A. 0

B. 1

C. 2

D. 6

E. 8

6. If $p(x) = 4x - 6$ and $p(a) = 0$, then $a =$

A. -6

B. $-\frac{3}{2}$

C. $\frac{3}{2}$

D. $\frac{2}{3}$

E. 2

7. If $f(x) = e^x$ and $g(x) = \sin x$, then the value of $(f \circ g)(\sqrt{2})$ is

A. -0.01

B. -0.8

C. 0.34

D. 1.8

E. 2.7

Inverses Function

1. If $f(x) = 2x - 3$, the inverse of f, f^{-1}, could be represented by

A. $f^1(x) = 3x - 2$

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

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

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

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

2. If $f(x) = x$, the inverse of f, f^{-1}, could be represented by

A. $f^{-1}(x) = x$

B. $f^{-1}(x) = 1$

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

D. $f^{-1}(x)=y$

E. f^{-1} does not exist

3. The inverse of f = {(1,2),(2,3),(3,4),(4,1),(5,2)} would be a function if the domain of f is limited to

A. {1,3,5}

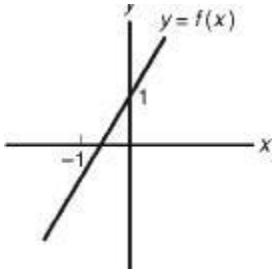
B. {1,2,3,4}

C. {1,5}

D. {1,2,4,5}

E. {1,2,3,4,5}

4. Which of the following could represent the equation of the inverse of the graph in the figure?



A. $y = -2x + 1$

B. $y = 2x + 1$

C. $y=\frac{1}{2}x+1$

D. $y=\frac{1}{2}x-1$

E. $y=\frac{1}{2}x-\frac{1}{2}$

Odd and Even Functions

1. Which of the following relations are *even*?

I. $y = 2$

II. $f(x) = x$

III. $x^2 + y^2 = 1$

A. only I

B. only I and II

C. only II and III

D. only I and III

E. I, II, and III

2. Which of the following relations are *odd*?

I. $y = 2$

II. $y = x$

III. $x^2 + y^2 = 1$

A. only II

B. only I and II

C. only I and III

D. only II and III

E. I, II, and III

3. Which of the following relations are both *odd* and *even*?

I. $x^2 + y^2 = 1$

II. $x^2 - y^2 = 0$

III. $x + y = 0$

A. only III

B. only I and II

C. only I and III

D. only II and III

E. I, II, and III

4. Which of the following functions is neither *odd* nor *even*?

A. {(1,2),(4,7),(-1,2),(0,4),(-4,7)}

B. {(1,2),(4,7),(-1,-2),(0,0),(-4,-7)}

C. $y = x^3 - 1$

D. $y = x^2 - 1$

E. $f(x) = -x$

Linear Functions

1. The slope of the line through points $A(3,-2)$ and $B(-2,-3)$ is

A. -5

B. $-\frac{1}{5}$

C. $\frac{1}{5}$

D. 1

E. 5

2. The slope of line $8x + 12y + 5 = 0$ is

A. $-\frac{3}{2}$

B. $-\frac{2}{3}$

C. $\frac{2}{3}$

D. 2

E. 3

3. The slope of the line perpendicular to line $3x - 5y + 8 = 0$ is

A. $-\frac{5}{3}$

B. $-\frac{3}{5}$

C. $\frac{3}{5}$

D. $\frac{5}{3}$

E. 3

4. The *y*-intercept of the line through the two points whose coordinates are (5,-2) and (1,3) is

A. $-\frac{5}{4}$

B. $\frac{5}{4}$

C. $\frac{17}{4}$

D. 7

E. 17

5. The equation of the perpendicular bisector of the segment joining the points whose coordinates are (1,4) and (-2,3) is

A. $3x - 2y + 5 = 0$

B. $x - 3y + 2 = 0$

C. $3x + y - 2 = 0$

D. $x - 3y + 11 = 0$

E. $x + 3y - 10 = 0$

6. The length of the segment joining the points with coordinates (-2,4) and (3,-5) is

A. 2.8

B. 3.7

C. 10

D. 10.3

E. none of these

7. The slope of the line parallel to the line whose equation is $2x + 3y = 8$ is

A. -2

B. $-\frac{3}{2}$

C. $-\frac{2}{3}$

D. $\frac{2}{3}$

E. $\frac{3}{2}$

8. If the graph of $\pi x + \sqrt{2}y + \sqrt{3} = 0$ is perpendicular to the graph of $ax + 3y + 2 = 0$, then a =

A. -4.5

B. -2.22

C. -1.35

D. 0.45

E. 1.35

Quadratic Functions

1. The coordinates of the vertex of the parabola whose equation is $y = 2x^2 + 4x - 5$ are

A. (2, 11)

B. (-1, -7)

C. (1, 1)

D. (-2, -5)

E. (-4, 11)

2. The range of the function

$f = \{(x,y): y = 5 - 4x - x^2\}$ is

A. $\{y: y \leq 0\}$

B. $\{y: y \geq -9\}$

C. $\{y: y \leq 9\}$

D. $\{y: y \geq 0\}$

E. $\{y: y \leq 1\}$

3. The equation of the axis of symmetry of the function $y = 2x^2 + 3x - 6$ is

A. $x = -\frac{3}{2}$

B. $x = -\frac{3}{4}$

C. $x = -\frac{1}{3}$

D. $x = \frac{1}{3}$

E. $x = \frac{3}{4}$

4. Find the zeros of $y = 2x^2 + x - 6$.

A. 3 and 2

B. -3 and 2

C. $\frac{1}{2}$ and $\frac{3}{2}$

D. $-\frac{3}{2}$ and 1

E. $\frac{3}{2}$ and -2

5. The sum of the zeros of $y = 3x^2 - 6x - 4$ is

A. -2

B. $-\frac{4}{3}$

C. $\frac{4}{3}$

D. 2

E. 6

6. $x^2 + 2x + 3 = 0$ has

A. two real rational roots

B. two real irrational roots

C. two equal real roots

D. two equal rational roots

E. two complex conjugate roots

7. A parabola with a vertical axis has its vertex at the origin and passes through point (7,7). The parabola intersects line $y = 6$ at two points. The length of the segment joining these points is

A. 14

B. 13

C. 12

D. 8.6

E. 6.5

Higher-Degree Polynomial Functions

1. $P(x) = ax^4 + x^3 - bx^2 - 4x + c$. If $P(x)$ increases without bound as x increases without bound, then, as x decreases without bound, $P(x)$

A. increases without bound

B. decreases without bound

C. approaches zero from above the x-axis

D. approaches zero from below the x-axis

E. cannot be determined

2. Which of the following is an odd function?

I. $f(x) = 3x^3 + 5$

II. $g(x) = 4x^6 + 2x^4 - 3x^2$

III. $h(x) = 7x^5 - 8x^3 + 12x$

A. only I

B. only II

C. only III

D. only I and II

E. only I and III

3. How many possible rational roots are there for $2x^4 + 4x^3 - 6x^2 + 15x - 12 = 0$?

A. 4

B. 6

C. 8

D. 12

E. 16

4. If both x - 1 and x - 2 are factors of $x^3 - 3x^2 + 2x - 4b$, then b must be

A. 0

B. 1

C. 2

D. 3

E. 4

5. If $3x^3 - 9x^2 + Kx - 12$ is divisible by x - 3, then K =

A. -40

B. -3

C. 3

D. 4

E. 22

6. Write the equation of lowest degree with real coefficients if two of its roots are -1 and 1 + i.

A. $x^3 + x^2 + 2 = 0$

B. $x^3 - x^2 - 2 = 0$

C. $x^3 - x + 2 = 0$

D. $x^3 - x^2 + 2 = 0$

E. none of the above

Inequalities

1. Which of the following is equivalent to $3x^2 - x < 2$?

A. $-\frac{3}{2} < x < 1$

B. $-1 < x < \frac{2}{3}$

C. $-\frac{2}{3} < x < 1$

D. $-1 < x < \frac{3}{2}$

E. $x < -\frac{2}{3}$ or $x > 1$

2. Solve $x^5 - 3x^3 + 2x^2 - 3 > 0$.

A. $(-\infty,-0.87)$

B. (-1.90,-0.87)

C. $(-1.90,-0.87) \cup (1.58,\infty)$

D. (-0.87,1.58)

E. $(1.58,\infty)$

3. The number of integers that satisfy the inequality $x^2 + 48 < 16x$ is

A. 0

B. 4

C. 7

D. an infinite number

E. none of the above

Trigonometric Functions and Their Inverses Definitions

1. Express cos 320° as a function of an angle between 0° and 90°.

A. cos 40°

B. sin 40°

C. cos 5°

D. sin 50°

E. none of the above

2. If point *P*(-5,12) lies on the terminal side of $\angle\theta$ in standard position, sin θ =

A. $-\frac{12}{13}$

B. $\frac{-5}{12}$

C. $\frac{-5}{13}$

D. $\frac{12}{13}$

E. $\frac{12}{5}$

3. If $\sec\theta = -\frac{5}{4}$ and $\sin\theta > 0$, then $\tan\theta$=

A. $\frac{4}{3}$

B. $\frac{3}{4}$

C. $-\frac{3}{4}$

D. $-\frac{4}{3}$

E. none of the above

4. If *x* is an angle in quadrant III and tan (*x* - 30°) = cot *x*, find *x*.

A. 240°

B. 225°

C. 210°

D. 60°

E. none of the above

5. If 90° < α < 180° and 270° < β < 360°, then which of the following *cannot* be true?

A. sin α = sin β

B. tan α = sin β

C. tan α = tan β

D. sin α = cos β

E. sec α = csc β

6. Expressed as a function of an acute angle, cos 310° + cos 190° =

A. -cos 40°

B. cos 70°

C. -cos 50°

D. sin 20°

E. -cos 70°

Arcs and Angles

1. An angle of 30 radians is equal to how many degrees?

A. $\frac{\pi}{30}$

B. $\frac{\pi}{6}$

C. $\frac{30}{\pi}$

D. $\frac{540}{\pi}$

E. $\frac{5400}{\pi}$

2. If a sector of a circle has an arc length of 2π inches and an area of 6π square inches, what is the length of the radius of the circle?

A. 1

B. 2

C. 3

D. 6

E. 12

3. If a circle has a circumference of 16 inches, the area of a sector with a central angle of 4.7 radians is

A. 10

B. 12

C. 15

D. 25

E. 48

4. A central angle of 40° in a circle of radius 1 inch intercepts an arc whose length is *s*. Find *s*.

A. 0.7

B. 1.4

C. 2

D. 3

E. 40

5. The pendulum on a clock swings through an angle of 25°, and the tip sweeps out an arc of 12 inches. How long is the pendulum?

A. 1.67 inches

B. 13.8 inches

C. 27.5 inches

D. 43.2 inches

E. 86.4 inches