SAT Math

Nonlinear Equations and Systems 3

Question #	ID
3.1	fc3d783a

In the xy-plane, a line with equation $2y = 4.5$ intersects a parabola at exactly one point. If the parabola has equation $y = -4x^2 + bx$, where b is a positive constant, what is the value of b?

3.2 4661e2a9

$$x - y = 1$$
$$x + y = x^2 - 3$$

Which ordered pair is a solution to the system of equations above?

A. $\left(1 + \sqrt{3}, \sqrt{3}\right)$

B. $\left(\sqrt{3}, -\sqrt{3}\right)$

C. $\left(1 + \sqrt{5}, \sqrt{5}\right)$

D. $\left(\sqrt{5}, -1 + \sqrt{5}\right)$

3.3 f65288e8

$$\frac{1}{x^2 + 10x + 25} = 4$$

If x is a solution to the given equation, which of the following is a possible value of $x + 5$?

A. $\dfrac{1}{2}$

B. $\dfrac{5}{2}$

C. $\dfrac{9}{2}$

D. $\dfrac{11}{2}$

3.4 f2f3fa00

During a 5-second time interval, the average acceleration a, in meters per second squared, of an object with an initial velocity of 12 meters per second is defined by the equation $a = \dfrac{v_f - 12}{5}$, where v_f is the final velocity of the object in meters per second. If the equation is rewritten in the form $v_f = xa + y$, where x and y are constants, what is the value of x ?

Question #	ID
3.5	6ce95fc8

$$2x^2 - 2 = 2x + 3$$

Which of the following is a solution to the equation above?

A. 2

B. $1 - \sqrt{11}$

C. $\dfrac{1}{2} + \sqrt{11}$

D. $\dfrac{1 + \sqrt{11}}{2}$

| **3.6** | c303ad23 |

If $3x^2 - 18x - 15 = 0$, what is the value of $x^2 - 6x$?

| **3.7** | 7bd10ef3 |

$$2x^2 - 4x = t$$

In the equation above, t is a constant. If the equation has no real solutions, which of the following could be the value of t ?

A. -3

B. -1

C. 1

D. 3

| **3.8** | 66bce0c1 |

$$\sqrt{2x + 6} + 4 = x + 3$$

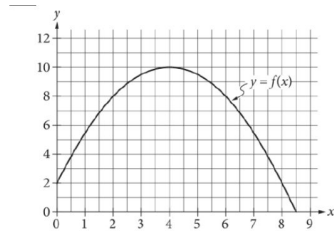What is the solution set of the equation above?

A. $\{-1\}$

B. $\{5\}$

C. $\{-1, 5\}$

D. $\{0, -1, 5\}$

Question #	ID
3.9	97e50fa2

The graph of the function f, defined by $f(x) = -\frac{1}{2}(x-4)^2 + 10$, is shown in the xy-plane above. If the function g (not shown) is defined by $g(x) = -x + 10$, what is one possible value of a such that $f(a) = g(a)$?

3.10   3d12b1e0

$$-16x^2 - 8x + c = 0$$

In the given equation, c is a constant. The equation has exactly one solution. What is the value of c?

3.11   71014fb1

$$(x - 1)^2 = -4$$

How many distinct real solutions does the given equation have?

A. Exactly one

B. Exactly two

C. Infinitely many

D. Zero

3.12   e9349667

$$y = x^2 + 2x + 1$$
$$x + y + 1 = 0$$

If (x_1, y_1) and (x_2, y_2) are the two solutions to the system of equations above, what is the value of $y_1 + y_2$?

A. -3

B. -2

C. -1

D. 1

Question #	ID
3.13	b03adde3

If $u - 3 = \dfrac{6}{t-2}$, what is t in terms of u ?

A. $t = \dfrac{1}{u}$

B. $t = \dfrac{2u+9}{u}$

C. $t = \dfrac{1}{u-3}$

D. $t = \dfrac{2u}{u-3}$

3.14   30281058

In the xy-plane, the graph of $y = x^2 - 9$ intersects line p at $(1,a)$ and $(5,b)$, where a and b are constants. What is the slope of line p ?

A. 6

B. 2

C. -2

D. -6

3.15   5910bfff

$$D = T - \frac{9}{25}(100 - H)$$

The formula above can be used to approximate the dew point D, in degrees Fahrenheit, given the temperature T, in degrees Fahrenheit, and the relative humidity of H percent, where $H > 50$. Which of the following expresses the relative humidity in terms of the temperature and the dew point?

A. $H = \dfrac{25}{9}(D - T) + 100$

B. $H = \dfrac{25}{9}(D - T) - 100$

C. $H = \dfrac{25}{9}(D + T) + 100$

D. $H = \dfrac{25}{9}(D + T) - 100$

Question #	ID
3.16	1697ffcf

In the xy-plane, the graph of $y = 3x^2 - 14x$ intersects the graph of $y = x$ at the points $(0, 0)$ and (a, a). What is the value of a ?

3.17   ff2e5c76

$$x^2 - 40x - 10 = 0$$

What is the sum of the solutions to the given equation?

A. 0

B. 5

C. 10

D. 40

3.18   2c5c22d0

$$y = x^2 + 3x - 7$$
$$y - 5x + 8 = 0$$

How many solutions are there to the system of equations above?

A. There are exactly 4 solutions.

B. There are exactly 2 solutions.

C. There is exactly 1 solution.

D. There are no solutions.

3.19   fc3dfa26

$$\frac{4x^2}{x^2 - 9} - \frac{2x}{x + 3} = \frac{1}{x - 3}$$

What value of x satisfies the equation above?

A. -3

B. $-\dfrac{1}{2}$

C. $\dfrac{1}{2}$

D. 3

Question #	ID
3.20	58b109d4

$$x^2 + y + 7 = 7$$
$$20x + 100 - y = 0$$

The solution to the given system of equations is (x, y). What is the value of x?

| **3.21** | 7028c74f |

$5(x + 7) = 15(x - 17)(x + 7)$ What is the sum of the solutions to the given equation?

| **3.22** | e11294f9 |

The solutions to $x^2 + 6x + 7 = 0$ are r and s, where $r < s$. The solutions to $x^2 + 8x + 8 = 0$ are t and u, where $t < u$. The solutions to $x^2 + 14x + c = 0$, where c is a constant, are $r + t$ and $s + u$. What is the value of c?

| **3.23** | f5aa5040 |

In the xy-plane, a line with equation $2y = c$ for some constant c intersects a parabola at exactly one point. If the parabola has equation $y = -2x^2 + 9x$, what is the value of c?

| **3.24** | 7dbd46d9 |

$$8x + y = -11$$
$$2x^2 = y + 341$$

The graphs of the equations in the given system of equations intersect at the point (x, y) in the xy-plane. What is a possible value of x?

A. -15

B. -11

C. 2

D. 8

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Question #	ID
3.25	6011a3f8

$$64x^2 + bx + 25 = 0$$

In the given equation, b is a constant. For which of the following values of b will the equation have more than one real solution?

A. -91

B. -80

C. 5

D. 40

3.26   77c0cced

$$y = 2x^2 - 21x + 64$$
$$y = 3x + a$$

In the given system of equations, a is a constant. The graphs of the equations in the given system intersect at exactly one point, (x, y), in the xy-plane. What is the value of x?

A. -8

B. -6

C. 6

D. 8

3.27   3a9d60b2

$$2|4 - x| + 3|4 - x| = 25$$

What is the positive solution to the given equation?

3.28   abcd0012

$$(3x + p)(5x^2 - 45)(2x^2 - 16x + 6p) = 0$$

In the given equation, p is a positive constant. The sum of the solutions to the equation is $\frac{20}{3}$. What is the value of p?

Question #	ID
3.29	88a0c425

$$-2x^2 + 20x + c = 0$$

In the given equation, c is a constant. The equation has exactly one solution. What is the value of c?

A. -68

B. -50

C. -32

D. 0

3.30	722de804

$$(x - 47)^2 = 1$$

What is the sum of the solutions to the given equation?