

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 2d1e5eff

$$\begin{aligned}y &= 2x^2 - 21x + 64 \\ y &= 3x + a\end{aligned}$$

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

Desmos find a now $a = -8$
 $\rightarrow (6, 10)$
//

Question ID 68298043

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 68298043

$$y + k = x + 26$$

$$y - k = x^2 - 5x$$

In the given system of equations, k is a constant. The system has exactly one distinct real solution. What is the value of k ?

Desmos [!]low $k \rightarrow k = 17.5 //$

Question ID 65244c8d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 65244c8d

$$\sqrt{(x - 2)^2} = \sqrt{3x + 34}$$

What is the smallest solution to the given equation?

Desmos → (-3, 5), (10, 8)

Question ID 8217606b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 8217606b

$$64x^2 - (16a + 4b)x + ab = 0$$

In the given equation, a and b are positive constants. The sum of the solutions to the given equation is $k(4a + b)$, where k is a constant. What is the value of k ?

$$\begin{aligned} \frac{-b}{a} &= \frac{16a + 4b}{64} = \underbrace{k(4a + b)} \\ &= \frac{\cancel{4}(4a + b)}{\cancel{4} \times 16} \\ k &= \frac{1}{16} // \text{ or } 0.0625 // \end{aligned}$$

Question ID 0e4cd7da

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 0e4cd7da

Which quadratic equation has no real solutions?

- A. $x^2 + 14x - 49 = 0$
- B. $x^2 - 14x + 49 = 0$
- C. $5x^2 - 14x - 49 = 0$
- ~~D. $5x^2 - 14x + 49 = 0$~~

Desmos ກວດ (ໄວ້)

ໄວ້ $b^2 - 4ac$

Question ID 536832c0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 536832c0



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 ?

Question ID 6c28bdc9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 6c28bdc9

$$x(x + 1) - 56 = 4x(x - 7)$$

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

$= 4x(x - 7)$
ons to the given equation?

Desmos $\rightarrow$ $(0, 0)$, $(7, 0)$, $(2.6667, -46.)$
2222

$x^2 + x - 56 = 4x^2 - 28x$
 $0 = 3x^2 - 29x + 56$
 $-\frac{b}{a} = \frac{29}{3}, 9.6667$
//
(ดีกว่า)

$+ \text{กัน} = 9.6667$
//

ระวังทศนิยม

Question ID c9d2651d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: c9d2651d



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

Question ID b40b491b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: b40b491b

$$\frac{14x}{7y} = 2\sqrt{w + 19}$$

The given equation relates the distinct positive real numbers w , x , and y . Which equation correctly expresses w in terms of x and y ?

- A. $w = \sqrt{\frac{x}{y}} - 19$
- B. $w = \sqrt{\frac{28x}{14y}} - 19$
- C. $w = \left(\frac{x}{y}\right)^2 - 19$
- D. $w = \left(\frac{28x}{14y}\right)^2 - 19$

$$\frac{x}{y} = \sqrt{w + 19}$$
$$\left(\frac{x}{y}\right)^2 = w + 19$$
$$\left(\frac{x}{y}\right)^2 - 19 = w$$

Question ID d9799723

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: d9799723



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

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

- A. 0
- B. 5
- C. 10
- D. 40

Question ID 9298a52e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 9298a52e



$$x^2 + y + 7 = 7$$

$$20x + 100 - y = 0$$

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

Question ID 8e46ba71

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 8e46ba71

$$\sqrt{k - x} = 58 - x$$

In the given equation, k is a constant. The equation has exactly one real solution. What is the minimum possible value of $4k$?

Desmos gives $k \rightarrow k = \underline{57.75}$

$$\begin{aligned} 4k &= 4(57.75) \\ &= 231 // \end{aligned}$$

Question ID e1774551

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: e1774551

$| -5x + 13 | = 73$

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

- A. $-\frac{146}{5}$
- B. -12
- C. 0
- ~~D. $\frac{26}{5}$~~

Desmos $\rightarrow$ $(\underline{-12}, 73), (\underline{17.2}, 73)$

Sum of X = $-12 + 17.2$

= $\frac{26}{5}$ or 5.2

// //

Question ID cde831b3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: cde831b3

$x^2 - 2x - 9 = 0$

One solution to the given equation can be written as $1 + \sqrt{k}$, where k is a constant. What is the value of k ?

- A. 8
- ~~B. 10~~
- C. 20
- D. 40

Desmos $\rightarrow x = -2.16, 4.16$
แทนค่า k ในข้อ

Question ID 95b69a20

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 95b69a20

ลองแทน $C = 0$ ก็ได้

$$\frac{x^2}{\sqrt{x^2 - c^2}} = \frac{c^2}{\sqrt{x^2 - c^2}} + 39$$

In the given equation, c is a positive constant. Which of the following is one of the solutions to the given equation?

- A. $-c$
- B. $-c^2 - 39^2$
- C. $-\sqrt{39^2 - c^2}$
- ~~D. $-\sqrt{c^2 + 39^2}$~~

จัดรูป

$$\frac{x^2 - c^2}{\sqrt{x^2 - c^2}} = 39$$

$$\frac{A^2}{A} = 39$$

$$A^2 = 39A \quad A \neq 0$$

$$A^2 - 39A = 0$$

$$A = \cancel{0}, 39$$

$$\sqrt{x^2 - c^2} = 39$$

$$x^2 - c^2 = 39^2$$

$$x^2 = 39^2 + c^2$$

$$x = \sqrt{39^2 + c^2}, -\sqrt{39^2 + c^2}$$

// //

Question ID b939a904

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: b939a904

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

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

Desmos แทนค่า b

Question ID 1844a2ab

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 1844a2ab

$$y = -2.5$$
$$y = x^2 + 8x + k$$

In the given system of equations, k is a positive integer constant. The system has no real solutions. What is the least possible value of k ?

Desmos $\rightarrow$ $k = 13.5 \approx$ $\begin{matrix} \nearrow \cancel{13} \\ \searrow 14 // \end{matrix}$ ^{1 solution}

$$-2.5 = x^2 + 8x + k$$
$$0 = x^2 + 8x + k + 2.5$$
$$b^2 - 4ac < 0$$
$$64 - 4(1)(k + 2.5) < 0$$
$$64 - 4k - 10 < 0$$
$$-4k + 54 < 0$$
$$k > 13.5$$

14 //

Question ID 98a35f81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 98a35f81

$x(kx - 56) = -16$

In the given equation, k is an integer constant. If the equation has no real solution, what is the least possible value of k ?

Desmos $\rightarrow$ $k = 49$ $\nearrow$ 50 //
 known k $\searrow$ ~~48~~
 1 solution

Question ID 2d8f1f6a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 2d8f1f6a

$$8x + y = -11$$

$$2x^2 = y + 341$$

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. ~~-1~~
C. 2
D. 8
- Desmos $\rightarrow$ (11, -99), (-15, 109)

Question ID 962eb92e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 962eb92e

ลองแทนค่าให้ตามเงื่อนไขโจทย์ หากค่า n

$$\frac{12}{n} - \frac{2}{t} = -\frac{2}{w}$$

The given equation relates the variables n , t , and w , where $n > 0$, $t > 0$, and $w > t$. Which expression is equivalent to n ?

- A. $12tw$
- B. $6(t - w)$
- C. $\frac{w-t}{6tw}$
- ~~D. $\frac{6tw}{w-t}$~~

$$\frac{12}{n} = \frac{2}{t} - \frac{2}{w}$$
$$\frac{12}{n} = \frac{2w-2t}{wt}$$
$$12wt = n(2w-2t)$$
$$\frac{12wt}{2w-2t} = n$$
$$\frac{6wt}{w-t} = n$$
$$\cancel{12}wt \cancel{2} = n$$
$$2(w-t)$$
$$//$$

Question ID 2e655326

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 2e655326

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

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

Desmos → แทนค่า c ในข้อข

Question ID edcedac7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: edcedac7



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 ?

Question ID 14fe10e5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 14fe10e5

$|x - 9| + 45 = 63$

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

Desmos $\rightarrow x = -9, 27$

Sum of $x = -9 + 27$
 $= 18 //$

Question ID 960aabc0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 960aabc0

In the xy -plane, a line with equation $\underline{2y = c}$ 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 ?

↗️ กต Desmos ไม่ได้อ

ตัดที่ Vertex y

Desmos $\rightarrow$ Vertex $y = 10.125$

ตัด 1 จุด

$y = 10.125$

$2y = 20.25$

$c = 20.25 //$

Question ID 2b7d8635

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 2b7d8635

$$\begin{aligned}y &= -1.5 \\ y &= x^2 + 8x + a\end{aligned}$$

In the given system of equations, a is a positive constant. The system has exactly one distinct real solution. What is the value of a ?

Desmos $\rightarrow$ $a = 14.5 //$
เลือก a

Question ID 59cf1dd3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 59cf1dd3

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

How many distinct real solutions does the given equation have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- ~~D. Zero~~

ช้กกำลังคู่! $\rightarrow 0, +$

Question ID 33cc7555

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 33cc7555

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

What is the positive solution to the given equation?

$5|4 - x| = 25$
Desmos $|4 - x|$

$|4 - x| = 5$

$4 - x = 5 \quad | \quad 4 - x = -5$
 $x = \cancel{-1} \quad | \quad x = 9 //$

Question ID a4b12e2f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: a4b12e2f

$$-9x^2 + 30x + c = 0$$

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

- A. 3
- B. 0
- ~~C. -25~~
- D. -53

Desmos แทน C

Question ID 9f13fad1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 9f13fad1

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

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

Desmos → หาค่า c
 $c = -1 //$

Question ID b2e26a55

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: b2e26a55

In the xy -plane, the graph of the equation $y = -x^2 + 9x - 100$ intersects the line $y = c$ at exactly one point. What is the value of c ?

- A. $-\frac{481}{4}$ ✗
- B. -100 ✗
- ✗ C. $-\frac{319}{4}$
- D. $-\frac{9}{2}$ ✗

Desmos แทนค่า요

$y = -79.75 //$

Question ID 032caee7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 032caee7

$$x^2 - 34x + c = 0$$

In the given equation, c is a constant. The equation has no real solutions if $c > n$. What is the least possible value of n ?

$$\begin{aligned} b^2 - 4ac &< 0 \\ (-34)^2 - 4(1)c &< 0 \\ 1,156 - 4c &< 0 \\ c &> 289 \\ n &= 289 // \end{aligned}$$

Desmos ก็ได้ ดูความสูงจาก
Vertex ก่อน ถ้าเลือกเสียเวลา
และต้องวิเคราะห์ $c > n$
เสียเวลาไปอีก

Question ID 37cf569f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 37cf569f

$(x - 47)^2 = 1$

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

Desmos $x = 48, 46$
Sum of $x = 48 + 46$
 $= 94 //$

Question ID 54fecb11

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 54fecb11

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2x^2 - 8x - 7 = 0$$

One solution to the given equation can be written as $\frac{8 - \sqrt{k}}{4}$, where k is a constant. What is the value of k ?

$$x = \frac{8 \pm \sqrt{64 - 4(2)(-7)}}{2(2)}$$

$$x = \frac{4 + \sqrt{30}}{2}, \frac{4 - \sqrt{30}}{2}$$

✓✓

$$\frac{8 - \sqrt{k}}{4} = \frac{4 - \sqrt{30}}{2} \quad \leftarrow \text{Desmos}$$

$$\cancel{\frac{8}{4}} - \frac{\sqrt{k}}{4} = \cancel{\frac{4}{2}} - \frac{\sqrt{30}}{2}$$

$$k = 120 //$$

Question ID 14787dca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 14787dca

$$x - 29 = (x - a)(x - 29)$$

Which of the following are solutions to the given equation, where a is a constant and $a > 30$?

- I. a
 - II. $a + 1$
 - III. 29
- A. ~~I~~ and II only
- B. ~~I~~ and III only
- ~~C.~~ II and III only
- D. ~~I~~, II, and III

แทน $a = 31$ ตามเงื่อนไขโจทย์

$$x - 29 = (x - 31)(x - 29)$$

แทนค่าโดย $x = 31$ $x \rightarrow$ ค่าโดย

II. $x = 32$ ✓

III. $x = 29$ ✓

Question ID 409b7ab8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 409b7ab8

$$y = 18$$
$$y = -3(x - 18)^2 + 15$$

If the given equations are graphed in the xy -plane, at how many points do the graphs of the equations intersect?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- ~~D. Zero~~

Desmos → 0 solution

Question ID e7f2ab9c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: e7f2ab9c

$$57x^2 + (57b + a)x + ab = 0$$

In the given equation, a and b are positive constants. The product of the solutions to the given equation is kab , where k is a constant. What is the value of k ?

- ~~A. $\frac{1}{57}$~~
- B. $\frac{1}{19}$
- C. 1
- D. 57

$$\frac{ab}{57} = kab$$
$$k = \frac{1}{57} //$$

Question ID 2aaaec85

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 2aaaec85

$$-x^2 + bx - 676 = 0$$

In the given equation, b is a positive integer. The equation has no real solution. What is the greatest possible value of b ?

Desmos $\rightarrow$ $b = 52$ ~~53~~
 เลือก b (1 Solution) $\rightarrow$ 51 //

Question ID 36ca6037

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 36ca6037

$$\frac{20}{p} = \frac{20}{q} - \frac{20}{r} - \frac{20}{s}$$

The given equation relates the positive variables $p, q, r,$ and s . Which of the following is equivalent to q ?

- A. $p + r + s$
- B. $20(p + r + s)$
- ~~C. $\frac{prs}{pr+ps+rs}$~~
- D. $\frac{prs}{20p+20r+20s}$

$$\begin{aligned} \frac{20}{p} + \frac{20}{r} + \frac{20}{s} &= \frac{20}{q} \\ \frac{20rs + 20ps + 20pr}{prs} &= \frac{20}{q} \\ q &= \frac{\cancel{20}prs}{\cancel{20}rs + \cancel{20}ps + \cancel{20}pr} \\ &= \frac{prs}{rs + ps + pr} // \end{aligned}$$

Question ID 1aec2be9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 1aec2be9

$$\begin{aligned}y &= x + 9 \\ y &= x^2 + 16x + 63\end{aligned}$$

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

~~A. -6~~

B. 7

C. 9

D. 63

Desmos $\rightarrow (-6, 3), (-9, 0)$

Question ID 9a182495

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: 9a182495

$$5x^2 + 10x + 16 = 0$$

How many distinct real solutions does the given equation have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- ~~D. Zero~~

Desmos → 0 solution

Question ID dba8a697

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Hard

ID: dba8a697

$5(x + 7) = 15(x - 17)(x + 7)$

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

