Question Bank

Math

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Nonlinear Functions

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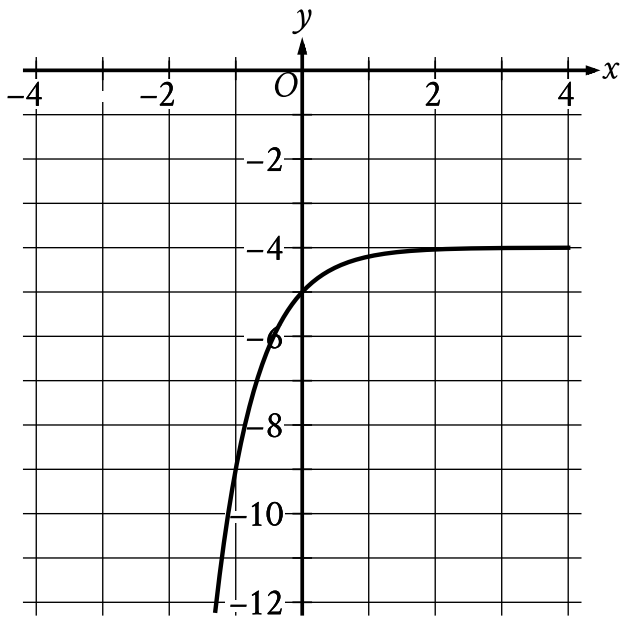
Question ID 6abec9a8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 6abec9a8



What is the y-intercept of the graph shown?

A. $(-1, -9)$

B. $(0, -5)$

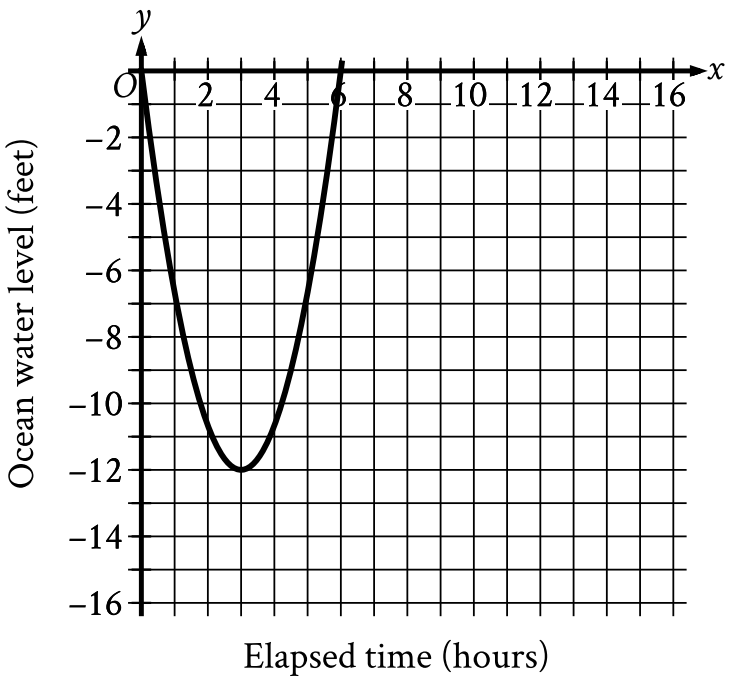
C. $(0, -4)$

D. $(0, 0)$

Question ID 1ee962ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 1ee962ec



Scientists recorded data about the ocean water levels at a certain location over a period of 6 hours. The graph shown models the data, where $y = 0$ represents sea level. Which table gives values of x and their corresponding values of y based on the model?

A.

x	y
0	-12
0	3
3	6

B.

x	y
0	0
3	12
0	-6

C.

x	y
0	0
3	-12

6	0

D.

x	y
0	0
12	3
-6	0

Question ID 788bfd56

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 788bfd56

The function f is defined by $f(x) = 4 + \sqrt{x}$. What is the value of $f(144)$?

A. 0

B. 16

C. 40

D. 76

Question ID b39d74a0

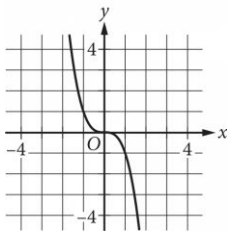
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: b39d74a0

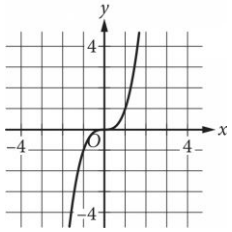
x	y
0	0
1	1
2	8
3	27

The table shown includes some values of x and their corresponding values of y. Which of the following graphs in the xy-plane could represent the relationship between x and y ?

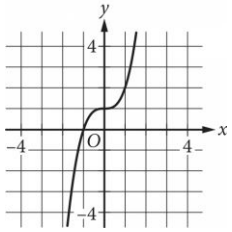
A.



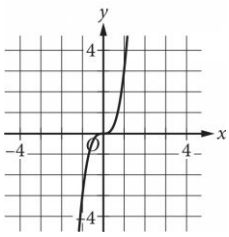
B.



C.



D.


y
4
x
−4
O
4
−4

Question ID 5377d9cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 5377d9cf

If $f(x)=\frac{x^2-6x+3}{x-1}$,

what is $f(-1)$?

A. –5

B. –2

C. 2

D. 5

Question ID 75915e3c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 75915e3c

$f(x) = 2(3^x)$

For the function f defined above, what is the value of $f(2)$?

A. 9

B. 12

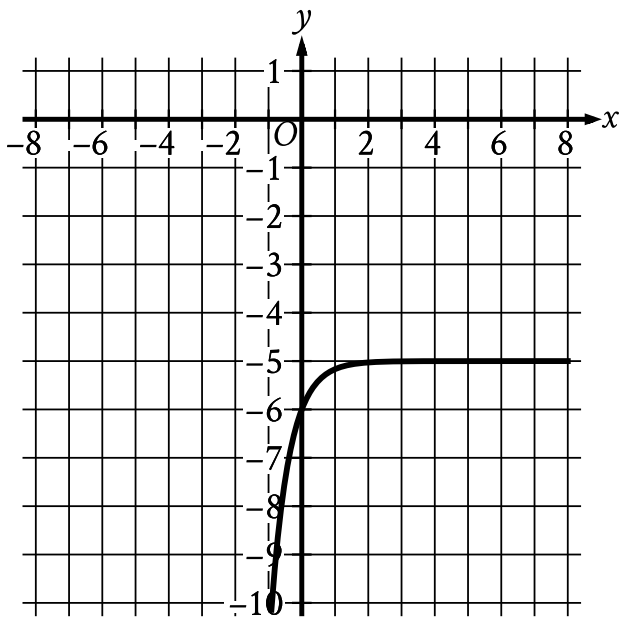
C. 18

D. 36

Question ID 7160cbb3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 7160cbb3



What is the *y*-intercept of the graph shown?

A. $(0, -6)$

B. $(-6, 0)$

C. $(0, 0)$

D. $(-5, -5)$

Question ID 72ae8a87

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 72ae8a87

The function $f(x) = 200{,}000(1.21)^x$ gives a company's predicted annual revenue, in dollars, x years after the company started selling light bulbs online, where $0 < x \leq 10$. What is the best interpretation of the statement "$f(5)$ is approximately equal to $518{,}748$" in this context?

A. 5 years after the company started selling light bulbs online, its predicted annual revenue is approximately $518{,}748$ dollars.

B. 5 years after the company started selling light bulbs online, its predicted annual revenue will have increased by a total of approximately $518{,}748$ dollars.

C. When the company's predicted annual revenue is approximately $518{,}748$ dollars, it is 5 times the predicted annual revenue for the previous year.

D. When the company's predicted annual revenue is approximately $518{,}748$ dollars, it is 5% greater than the predicted annual revenue for the previous year.

Question ID 09f58996

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

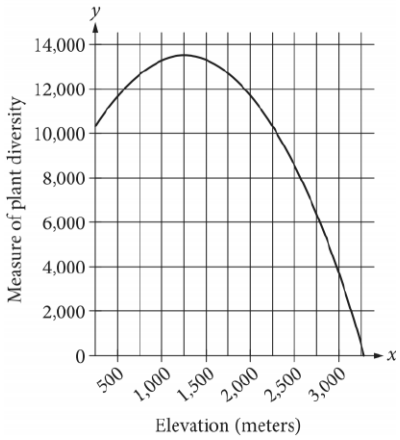
ID: 09f58996

The function f is defined by $f(x) = 6 + \sqrt{x}$. What is the value of $f(36)$?

Question ID ebe4bde0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: ebe4bde0



The quadratic function graphed above models a particular measure of plant diversity as a function of the elevation in a region of Switzerland. According to the model, which of the following is closest to the elevation, in meters, at which plant diversity is greatest?

A. 13,500

B. 3,000

C. 1,250

D. 250

Question ID d46da42c

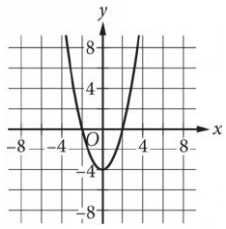
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: d46da42c

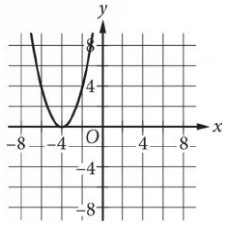
$f(x) = x^2 + 4$

The function f is defined as shown. Which of the following graphs in the xy-plane could be the graph of $y = f(x)$?

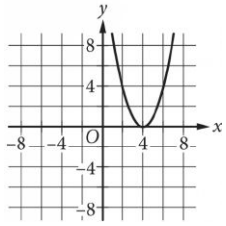
A.



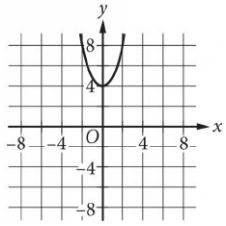
B.



C.



D.



Question ID 79ba511a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 79ba511a

The function f is defined by $f(x) = x^3 + 15$. What is the value of $f(2)$?

A. 20

B. 21

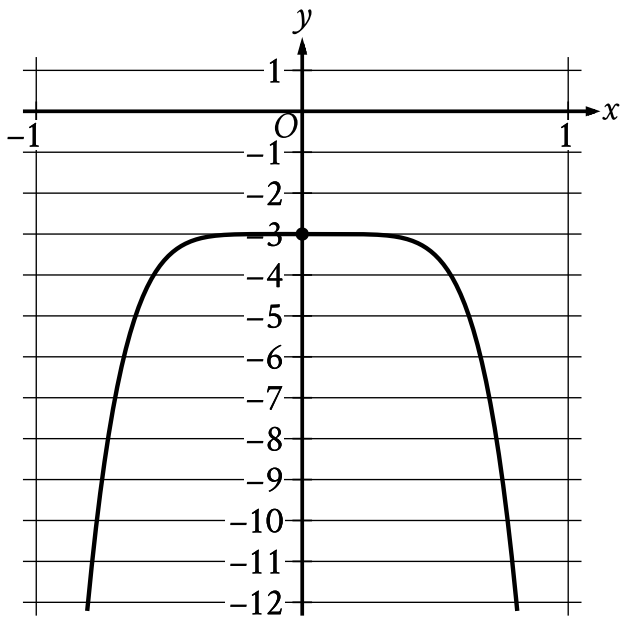
C. 23

D. 24

Question ID 50418728

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 50418728



The graph of the polynomial function f, where $y = f(x)$, is shown. The y-intercept of the graph is $(0, y)$. What is the value of y?

Question ID ee05c84e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: ee05c84e

$f(x) = (x + 0.25x)(50 - x)$

The function f is defined above. What is the value of $f(20)$?

A. 250

B. 500

C. 750

D. 2,000

Question ID f89af023

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: f89af023

A rectangular volleyball court has an area of 162 square meters. If the length of the court is twice the width, what is the width of the court, in meters?

A. 9

B. 18

C. 27

D. 54

Question ID e53add44

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: e53add44

$S(n) = 38{,}000a^n$

The function S above models the annual salary, in dollars, of an employee n years after starting a job, where a is a constant. If the employee's salary increases by 4% each year, what is the value of a ?

A. 0.04

B. 0.4

C. 1.04

D. 1.4

Question ID 926c246b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 926c246b

$D = 5{,}640(1.9)^t$

The equation above estimates the global data traffic D, in terabytes, for the year that is t years after 2010. What is the best interpretation of the number 5,640 in this context?

A. The estimated amount of increase of data traffic, in terabytes, each year

B. The estimated percent increase in the data traffic, in terabytes, each year

C. The estimated data traffic, in terabytes, for the year that is t years after 2010

D. The estimated data traffic, in terabytes, in 2010

Question ID 50e40f08

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 50e40f08

$$f(x) = (x + 6)(x - 4)$$

If the given function f is graphed in the *xy*-plane, where $y = f(x)$, what is the *x*-coordinate of an *x*-intercept of the graph?

Question ID be0c419e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: be0c419e

Immanuel purchased a certain rare coin on January 1. The function $f(x) = 65(1.03)^x$, where $0 \leq x \leq 10$, gives the predicted value, in dollars, of the rare coin x years after Immanuel purchased it. What is the best interpretation of the statement "$f(8)$ is approximately equal to 82" in this context?

A. When the rare coin's predicted value is approximately 82 dollars, it is 8% greater than the predicted value, in dollars, on January 1 of the previous year.

B. When the rare coin's predicted value is approximately 82 dollars, it is 8 times the predicted value, in dollars, on January 1 of the previous year.

C. From the day Immanuel purchased the rare coin to 8 years after Immanuel purchased the coin, its predicted value increased by a total of approximately 82 dollars.

D. 8 years after Immanuel purchased the rare coin, its predicted value is approximately 82 dollars.

Question ID a31417d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: a31417d1

From 2005 through 2014, the number of music CDs sold in the United States declined each year by approximately 15% of the number sold the preceding year. In 2005, approximately 600 million CDs were sold in the United States. Of the following, which best models C, the number of millions of CDs sold in the United States, t years after 2005?

A. $C = 600(0.15)^t$

B. $C = 600(0.85)^t$

C. $C = 600(1.15)^t$

D. $C = 600(1.85)^t$

Question ID c4cd5bcc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: c4cd5bcc

In the *xy*-plane, the *y*-coordinate of the *y*-intercept of the graph of the function *f* is *c*. Which of the following must be equal to *c* ?

A. $f(0)$

B. $f(1)$

C. $f(2)$

D. $f(3)$

Question ID 78d5f91a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 78d5f91a

$f(x)=x^3+3x^2-6x-1$

For the function f defined above, what is the value of $f(-1)$?

A. -11

B. -7

C. 7

D. 11

Question ID d675744f

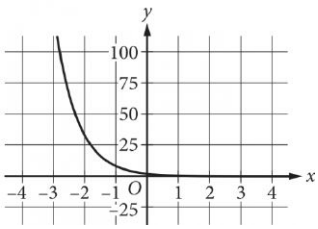
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: d675744f

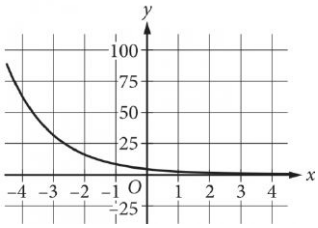
$y = 4(2^x)$

Which of the following is the graph in the *xy*-plane of the given equation?

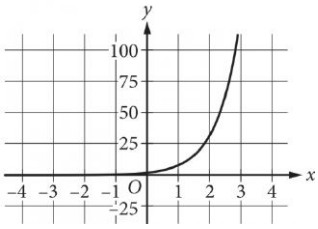
A.



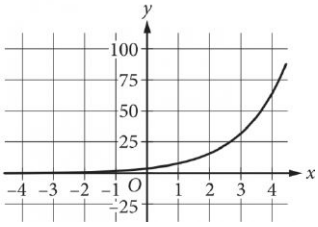
B.



C.



D.



Question ID f44a29a8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: f44a29a8

An object’s kinetic energy, in joules, is equal to the product of one-half the object’s mass, in kilograms, and the square of the object’s speed, in meters per second. What is the speed, in meters per second, of an object with a mass of 4 kilograms and kinetic energy of 18 joules?

A. 3

B. 6

C. 9

D. 36

Question ID d71f6dbf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: d71f6dbf

The height, in feet, of an object x seconds after it is thrown straight up in the air can be modeled by the function $h(x) = -16x^2 + 20x + 5$. Based on the model, which of the following statements best interprets the equation $h(1.4) = 1.64$?

A. The height of the object 1.4 seconds after being thrown straight up in the air is 1.64 feet.

B. The height of the object 1.64 seconds after being thrown straight up in the air is 1.4 feet.

C. The height of the object 1.64 seconds after being thrown straight up in the air is approximately 1.4 times as great as its initial height.

D. The speed of the object 1.4 seconds after being thrown straight up in the air is approximately 1.64 feet per second.

Question ID 6676f055

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 6676f055

$f(\theta) = -0.28(\theta - 27)^2 + 880$

An engineer wanted to identify the best angle for a cooling fan in an engine in order to get the greatest airflow. The engineer discovered that the function above models the airflow $f(\theta)$, in cubic feet per minute, as a function of the angle of the fan θ, in degrees. According to the model, what angle, in degrees, gives the greatest airflow?

A. –0.28

B. 0.28

C. 27

D. 880

Question ID dd8ac009

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: dd8ac009

Time (years)	Total amount (dollars)
0	670.00
1	674.02
2	678.06

Sara opened a savings account at a bank. The table shows the exponential relationship between the time t, in years, since Sara opened the account and the total amount d, in dollars, in the account. If Sara made no additional deposits or withdrawals, which of the following equations best represents the relationship between t and d?

A. $d = 0.006(1 + 670)^t$

B. $d = 670(1 + 0.006)^t$

C. $d = 0.006(670t)$

D. $d = 670(0.006 + t)$

Question ID 281a4f3b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 281a4f3b

A certain college had 3,000 students enrolled in 2015. The college predicts that after 2015, the number of students enrolled each year will be 2% less than the number of students enrolled the year before. Which of the following functions models the relationship between the number of students enrolled, $f(x)$, and the number of years after 2015, x ?

A. $f(x) = 0.02(3{,}000)^x$

B. $f(x) = 0.98(3{,}000)^x$

C. $f(x) = 3{,}000(0.02)^x$

D. $f(x) = 3{,}000(0.98)^x$

Question ID 100030d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 100030d9

A rubber ball bounces upward one-half the height that it falls each time it hits the ground. If the ball was originally dropped from a distance of 20.0 feet above the ground, what was its maximum height above the ground, in feet, between the third and fourth time it hit the ground?

Question ID c7a187a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: c7a187a7

$$f(x) = x^2 - 18x - 360$$

If the given function f is graphed in the *xy*-plane, where $y = f(x)$, what is an *x*-intercept of the graph?

A. $(-12, 0)$

B. $(-30, 0)$

C. $(-360, 0)$

D. $(12, 0)$

Question ID e1391dd6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: e1391dd6

According to Moore’s law, the number of transistors included on microprocessors doubles every 2 years. In 1985, a microprocessor was introduced that had 275,000 transistors. Based on this information, in which of the following years does Moore’s law estimate the number of transistors to reach 1.1 million?

A. 1987

B. 1989

C. 1991

D. 1994

Question ID 5bf0f84a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 5bf0f84a

$$h(t) = -16t^2 + 110t + 72$$

The function above models the height h, in feet, of an object above ground t seconds after being launched straight up in the air. What does the number 72 represent in the function?

A. The initial height, in feet, of the object

B. The maximum height, in feet, of the object

C. The initial speed, in feet per second, of the object

D. The maximum speed, in feet per second, of the object

Question ID 70ebd3d0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 70ebd3d0

$N(d) = 115(0.90)^d$

The function N defined above can be used to model the number of species of brachiopods at various ocean depths d, where d is in hundreds of meters. Which of the following does the model predict?

A. For every increase in depth by 1 meter, the number of brachiopod species decreases by 115.

B. For every increase in depth by 1 meter, the number of brachiopod species decreases by 10%.

C. For every increase in depth by 100 meters, the number of brachiopod species decreases by 115.

D. For every increase in depth by 100 meters, the number of brachiopod species decreases by 10%.

Question ID 97158b3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 97158b3a

The area *A*, in square centimeters, of a rectangular painting can be represented by the expression $w(w+29)$, where w is the width, in centimeters, of the painting. Which expression represents the length, in centimeters, of the painting?

A. w

B. 29

C. $(w+29)$

D. $w(w+29)$

Question ID dba7432e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: dba7432e

x	$f(x)$
0	5
1	$\frac{5}{2}$
2	$\frac{5}{4}$
3	$\frac{5}{8}$

The table above gives the values of the function f for some values of x.
Which of the following equations could define f ?

A. $f(x) = 5(2^{x+1})$

B. $f(x) = 5(2^{x})$

C. $f(x) = 5(2^{-(x+1)})$

D. $f(x) = 5(2^{-x})$

Question ID f5e8ccf1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: f5e8ccf1

$f(x) = (x+4)(x-1)(2x-3)$

The function f is defined above. Which of the following is NOT an x-intercept of the graph of the function in the xy-plane?

A. $(-4, 0)$

B. $\left(-\frac{2}{3}, 0\right)$

C. $(1, 0)$

D. $\left(\frac{3}{2}, 0\right)$

Question ID 5c00c2c1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■□

ID: 5c00c2c1

There were no jackrabbits in Australia before 1788 when 24 jackrabbits were introduced. By 1920 the population of jackrabbits had reached 10 billion. If the population had grown exponentially, this would correspond to a 16.2% increase, on average, in the population each year. Which of the following functions best models the population $p(t)$ of jackrabbits t years after 1788?

A. $p(t) = 1.162(24)^t$

B. $p(t) = 24(2)^{1.162t}$

C. $p(t) = 24(1.162)^t$

D. $p(t) = (24, \cdot, 1.162)^t$

Question ID 91e7ea5e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 91e7ea5e

$h(x)=2(x-4)^2-32$

The quadratic function h is defined as shown. In the xy-plane, the graph of $y=h(x)$ intersects the x-axis at the points $(0,0)$ and $(t,0)$, where t is a constant. What is the value of t ?

A. 1

B. 2

C. 4

D. 8

Question ID a9084ca4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: a9084ca4

$$f(x) = 9{,}000(0.66)^x$$

The given function f models the number of advertisements a company sent to its clients each year, where x represents the number of years since 1997, and $0 \leq x \leq 5$. If $y = f(x)$ is graphed in the *xy*-plane, which of the following is the best interpretation of the *y*-intercept of the graph in this context?

A. The minimum estimated number of advertisements the company sent to its clients during the 5 years was $1{,}708$.

B. The minimum estimated number of advertisements the company sent to its clients during the 5 years was $9{,}000$.

C. The estimated number of advertisements the company sent to its clients in 1997 was $1{,}708$.

D. The estimated number of advertisements the company sent to its clients in 1997 was $9{,}000$.

Question ID b8f13a3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: b8f13a3a

Function f is defined by $f(x) = -a^x + b$, where a and b are constants. In the *xy*-plane, the graph of $y = f(x) - 12$ has a *y*-intercept at $\left(0, -\frac{75}{7}\right)$. The product of a and b is $\frac{320}{7}$. What is the value of a?

Question ID 7902bed0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 7902bed0

A machine launches a softball from ground level. The softball reaches a maximum height of 51.84 meters above the ground at 1.8 seconds and hits the ground at 3.6 seconds. Which equation represents the height above ground h, in meters, of the softball t seconds after it is launched?

A. $h = -t^2 + 3.6$

B. $h = -t^2 + 51.84$

C. $h = -16(t + 51.84)^2 - 3.6$

D. $h = -16(t - 1.8)^2 + 51.84$

Question ID 4a0d0399

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 4a0d0399

The function f is defined by $f(x) = a^x + b$, where a and b are constants. In the xy-plane, the graph of $y = f(x)$ has an x-intercept at $(2, 0)$ and a y-intercept at $(0, -323)$. What is the value of b?

Question ID 9654add7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 9654add7

$f(x) = -500x^2 + 25{,}000x$

The revenue $f(x)$, in dollars, that a company receives from sales of a product is given by the function *f* above, where *x* is the unit price, in dollars, of the product. The graph of $y = f(x)$ in the *xy*-plane intersects the *x*-axis at 0 and *a*. What does *a* represent?

A. The revenue, in dollars, when the unit price of the product is $0

B. The unit price, in dollars, of the product that will result in maximum revenue

C. The unit price, in dollars, of the product that will result in a revenue of $0

D. The maximum revenue, in dollars, that the company can make

Question ID 263f9937

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 263f9937

Growth of a Culture of Bacteria

Day	Number of bacteria per milliliter at end of day
1	2.5×10^5
2	5.0×10^5
3	1.0×10^6

A culture of bacteria is growing at an exponential rate, as shown in the table above. At this rate, on which day would the number of bacteria per milliliter reach 5.12×10^8?

A. Day 5

B. Day 9

C. Day 11

D. Day 12

Question ID 18e35375

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 18e35375

$$f(x) = (x - 14)(x + 19)$$

The function f is defined by the given equation. For what value of x does $f(x)$ reach its minimum?

A. -266

B. -19

C. $-\frac{33}{2}$

D. $-\frac{5}{2}$

Question ID 9afe2370

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 9afe2370

The population P of a certain city y years after the last census is modeled by the equation below, where r is a constant and P_0 is the population when $y = 0$.

$P = P_0(1 + r)^y$

If during this time the population of the city decreases by a fixed percent each year, which of the following must be true?

A. $r < -1$

B. $-1 < r < 0$

C. $0 < r < 1$

D. $r > 1$

Question ID 0121a235

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 0121a235

x	$p(x)$
-2	5
-1	0
0	-3
1	-1
2	0

The table above gives selected values of a polynomial function p. Based on the values in the table, which of the following must be a factor of p ?

A. $(x-3)$

B. $(x+3)$

C. $(x-1)(x+2)$

D. $(x+1)(x-2)$

Question ID 70753f99

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 70753f99

The function f is defined by $f(x)=(x+3)(x+1)$. The graph of f in the xy-plane is a parabola. Which of the following intervals contains the x-coordinate of the vertex of the graph of f?

A. $-4<x<-3$

B. $-3<x<1$

C. $1<x<3$

D. $3<x<4$

Question ID 58dcc59f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 58dcc59f

A landscaper is designing a rectangular garden. The length of the garden is to be 5 feet longer than the width. If the area of the garden will be 104 square feet, what will be the length, in feet, of the garden?

Question ID 84dd43f8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 84dd43f8

For the function f, $f(0) = 86$, and for each increase in x by 1, the value of $f(x)$ decreases by 80%. What is the value of $f(2)$?

Question ID 59d1f4b5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 59d1f4b5

$M = 1{,}800(1.02)^t$

The equation above models the number of members, *M,* of a gym *t* years after the gym opens. Of the following, which equation models the number of members of the gym *q* quarter years after the gym opens?

A. $M = 1{,}800(1.02)^{\frac{q}{4}}$

B. $M = 1{,}800(1.02)^{4q}$

C. $M = 1{,}800(1.005)^{4q}$

D. $M = 1{,}800(1.082)^{q}$

Question ID 01668cd6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 01668cd6

The functions f and g are defined by the given equations, where $x \geq 0$. Which of the following equations displays, as a constant or coefficient, the maximum value of the function it defines, where $x \geq 0$?

I. $f(x) = 33(0.4)^{x+3}$

II. $g(x) = 33(0.16)(0.4)^{x-2}$

A. I only

B. II only

C. I and II

D. Neither I nor II

Question ID 635f54ee

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 635f54ee

The surface area of a cube is $6\left(\frac{a}{4}\right)^2$, where a is a positive constant. Which of the following gives the perimeter of one face of the cube?

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

B. a

C. $4a$

D. $6a$

Question ID de39858a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: de39858a

The function h is defined by $h(x) = a^x + b$, where a and b are positive constants. The graph of $y = h(x)$ in the xy-plane passes through the points $(0, 10)$ and $(-2, \frac{325}{36})$. What is the value of ab?

A. $\frac{1}{4}$

B. $\frac{1}{2}$

C. 54

D. 60

Question ID 1178f2df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 1178f2df

x	y
21	-8
23	8
25	-8

The table shows three values of x and their corresponding values of y, where $y = f(x) + 4$ and f is a quadratic function. What is the *y*-coordinate of the *y*-intercept of the graph of $y = f(x)$ in the *xy*-plane?

Question ID 84e8cc72

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 84e8cc72

A quadratic function models the height, in feet, of an object above the ground in terms of the time, in seconds, after the object is launched off an elevated surface. The model indicates the object has an initial height of 10 feet above the ground and reaches its maximum height of $1{,}034$ feet above the ground 8 seconds after being launched. Based on the model, what is the height, in feet, of the object above the ground 10 seconds after being launched?

A. 234

B. 778

C. 970

D. $1{,}014$

Question ID 4b642eef

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 4b642eef

The total distance *d*, in meters, traveled by an object moving in a straight line can be modeled by a quadratic function that is defined in terms of *t*, where *t* is the time in seconds. At a time of 10.0 seconds, the total distance traveled by the object is 50.0 meters, and at a time of 20.0 seconds, the total distance traveled by the object is 200.0 meters. If the object was at a distance of 0 meters when $t = 0$, then what is the total distance traveled, in meters, by the object after 30.0 seconds?

Question ID 9f2ecade

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 9f2ecade

$h(x) = x^3 + ax^2 + bx + c$

The function h is defined above, where a, b, and c are integer constants. If the zeros of the function are -5, 6, and 7, what is the value of c ?

Question ID 6f5540a5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 6f5540a5

Kao measured the temperature of a cup of hot chocolate placed in a room with a constant temperature of 70 degrees Fahrenheit (°F). The temperature of the hot chocolate was 185°F at 6:00 p.m. when it started cooling. The temperature of the hot chocolate was 156°F at 6:05 p.m. and 135°F at 6:10 p.m. The hot chocolate's temperature continued to decrease. Of the following functions, which best models the temperature $T(m)$, in degrees Fahrenheit, of Kao's hot chocolate *m* minutes after it started cooling?

A. $T(m) = 185(1.25)^m$

B. $T(m) = 185(0.85)^m$

C. $T(m) = (185 - 70)(0.75)^{\frac{m}{5}}$

D. $T(m) = 70 + 115(0.75)^{\frac{m}{5}}$

Question ID b73ee6cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: b73ee6cf

The population of a town is currently 50,000, and the population is estimated to increase each year by 3% from the previous year. Which of the following equations can be used to estimate the number of years, t, it will take for the population of the town to reach 60,000 ?

A. $50{,}000 = 60{,}000(0.03)^t$

B. $50{,}000 = 60{,}000(3)^t$

C. $60{,}000 = 50{,}000(0.03)^t$

D. $60{,}000 = 50{,}000(1.03)^t$

Question ID 7eed640d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 7eed640d

$h(x) = -16x^2 + 100x + 10$

The quadratic function above models the height above the ground h, in feet, of a projectile x seconds after it had been launched vertically. If $y = h(x)$ is graphed in the xy-plane, which of the following represents the real-life meaning of the positive x-intercept of the graph?

A. The initial height of the projectile

B. The maximum height of the projectile

C. The time at which the projectile reaches its maximum height

D. The time at which the projectile hits the ground

Question ID 43926bd9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 43926bd9

x	$f(x)$
1	a
2	a^5
3	a^9

For the exponential function f, the table above shows several values of x and their corresponding values of $f(x)$, where a is a constant greater than 1. If k is a constant and $f(k) = a^{29}$, what is the value of k ?

Question ID a7711fe8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: a7711fe8

What is the minimum value of the function f defined by $f(x)=(x-2)^2-4$?

A. -4

B. -2

C. 2

D. 4

Question ID 1a722d7d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■■■

ID: 1a722d7d

Let the function p be defined as $p(x)=\frac{(x-c)^2+160}{2c}$, where c is a constant. If $p(c)=10$, what is the value of $p(12)$?

A. 10.00

B. 10.25

C. 10.75

D. 11.00