Question 1

ADVANCED MATH COMBO SET 1

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 2

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

ID: 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 ?

Question 3

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 4

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

ID: 4661e2a9

$x - y = 1$

$x + y = x^2 - 3$

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

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

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

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

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

Question 5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	■■■

ID: 371cbf6b

$$(ax+3)(5x^2-bx+4)=20x^3-9x^2-2x+12$$

The equation above is true for all x, where a and b are constants. What is the value of ab ?

A. 18

B. 20

C. 24

D. 40

Question 6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	■■■

ID: 40c09d66

If $\frac{\sqrt{x^5}}{\sqrt[3]{x^4}} = x^{\frac{a}{b}}$ for all positive values of x, what is the value of $\frac{a}{b}$?

Question 7

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

ID: 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. $\frac{1}{2}$

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

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

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

Question 8

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

ID: 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 $a = \frac{v_f - 12}{5}$, 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 9

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

ID: 9654add7

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?

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

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 10

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	■■■

ID: 34847f8a

$$\frac{2}{x-2}+\frac{3}{x+5}=\frac{rx+t}{(x-2)(x+5)}$$

The equation above is true for all $x > 2$, where r and t are positive constants. What is the value of rt ?

A. -20

B. 15

C. 20

D. 60

Question 11

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 12

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	■■■

ID: 137cc6fd

$\sqrt[5]{70n}\left(\sqrt[6]{70n}\right)^2$ For what value of x is the given expression equivalent to $(70n)^{30x}$, where $n > 1$?

Question 13

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

ID: 6ce95fc8

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

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

A. 2

B. $1 - \sqrt{11}$

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

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

Question 14

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	■■■

ID: ea6d05bb

The expression $(3x - 23)(19x + 6)$ is equivalent to the expression $ax^2 + bx + c$, where a, b, and c are constants. What is the value of b?

Question 15

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	■■■

ID: d8789a4c

$$\frac{x^2-c}{x-b}$$

In the expression above, *b* and *c* are positive integers. If the expression is equivalent to $x+b$ and $x \neq b$, which of the following could be the value of *c* ?

A. 4

B. 6

C. 8

D. 10