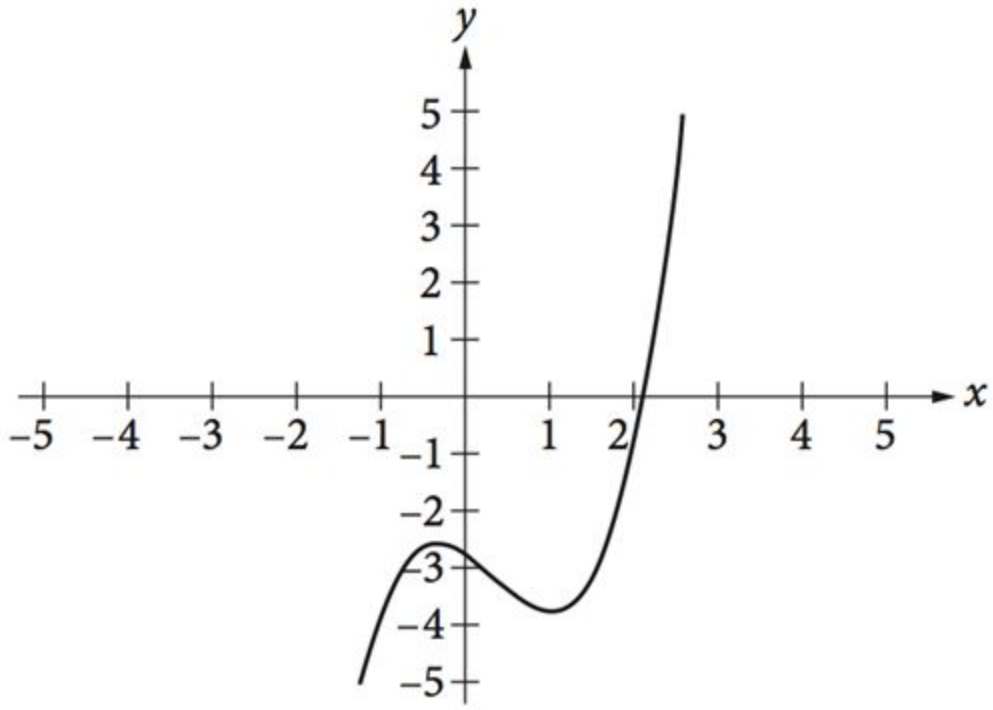
30



The function $f(x) = x^3 - x^2 - x - \frac{11}{4}$ is graphed in the xy-plane above. If k is a constant such that the equation $f(x) = k$ has three real solutions, which of the following could be the value of k ?

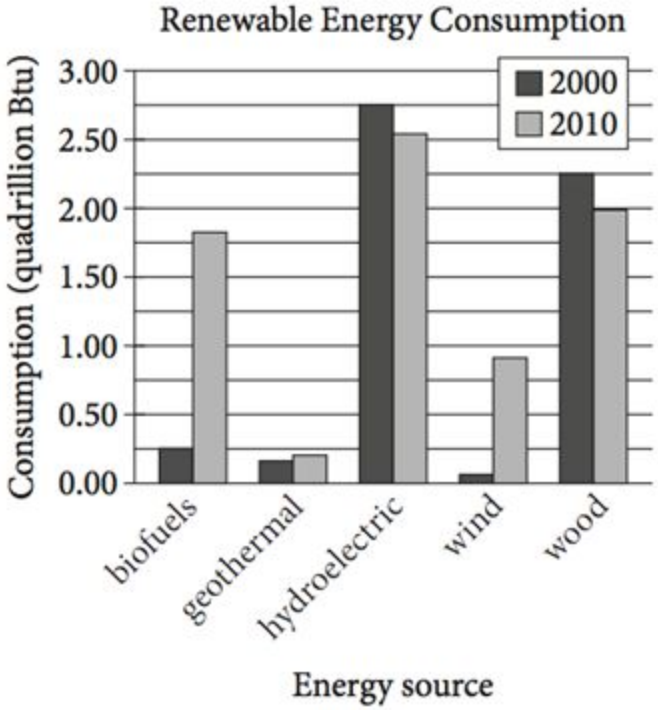
A) 2

B) 0

C) −2

D) −3

Questions 21 and 22 refer to the following information.



The bar graph above shows renewable energy consumption in quadrillions of British thermal units (Btu) in the United States, by energy source, for several energy sources in the years 2000 and 2010.

21

In a scatterplot of this data, where renewable energy consumption in the year 2000 is plotted along the x-axis and renewable energy consumption in the year 2010 is plotted along the y-axis for each of the given energy sources, how many data points would be above the line $y = x$?

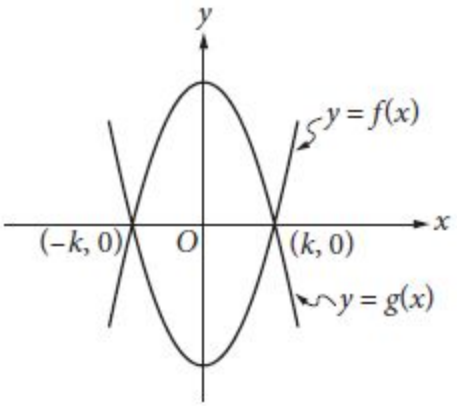
A) 1

B) 2

C) 3

D) 4

13



The functions f and g, defined by $f(x) = 8x^2 - 2$ and $g(x) = -8x^2 + 2$, are graphed in the xy-plane above. The graphs of f and g intersect at the points $(k, 0)$ and $(-k, 0)$. What is the value of k ?

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

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

C) 1

D) 2

12

$$y = a(x - 2)(x + 4)$$

In the quadratic equation above, a is a nonzero constant. The graph of the equation in the xy-plane is a parabola with vertex (c, d). Which of the following is equal to d ?

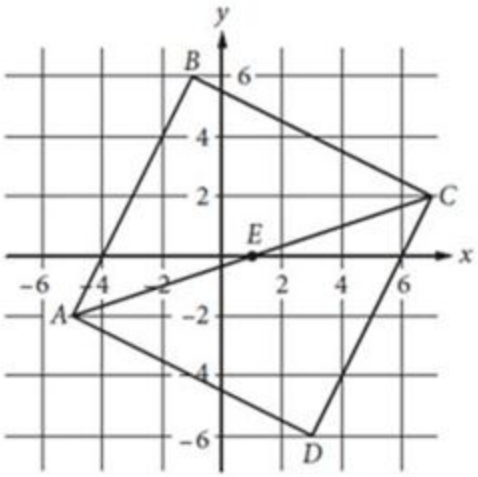
A) $-9a$

B) $-8a$

C) $-5a$

D) $-2a$

28



In the xy-plane above, $ABCD$ is a square and point E is the center of the square. The coordinates of points C and E are $(7, 2)$ and $(1, 0)$, respectively. Which of the following is an equation of the line that passes through points B and D ?

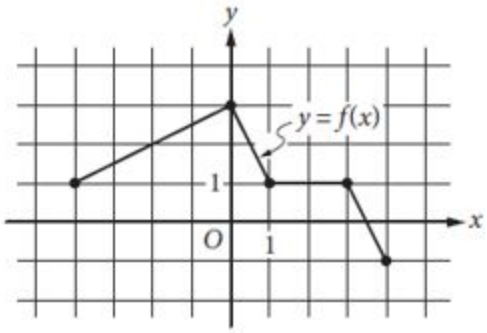
A) $y = -3x - 1$

B) $y = -3(x - 1)$

C) $y = -\frac{1}{3}x + 4$

D) $y = -\frac{1}{3}x - 1$

26



The complete graph of the function f is shown in the xy-plane above. Which of the following are equal to 1 ?

I. $f(-4)$

II. $f\left(\frac{3}{2}\right)$

III. $f(3)$

A) III only

B) I and III only

C) II and III only

D) I, II, and III

25

The graph of the linear function f has intercepts at $(a, 0)$ and $(0, b)$ in the xy-plane. If $a + b = 0$ and $a \neq b$, which of the following is true about the slope of the graph of f ?

A) It is positive.

B) It is negative.

C) It equals zero.

D) It is undefined.

29

For a polynomial $p(x)$, the value of $p(3)$ is -2. Which of the following must be true about $p(x)$?

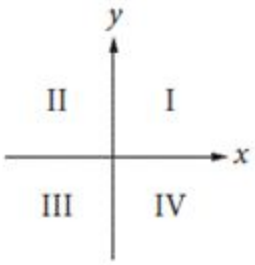
A) $x-5$ is a factor of $p(x)$.

B) $x-2$ is a factor of $p(x)$.

C) $x+2$ is a factor of $p(x)$.

D) The remainder when $p(x)$ is divided by $x-3$ is -2.

28



If the system of inequalities $y \geq 2x+1$ and $y > \frac{1}{2}x - 1$ is graphed in the xy-plane above, which quadrant contains no solutions to the system?

A) Quadrant II

B) Quadrant III

C) Quadrant IV

D) There are solutions in all four quadrants.