Quadratic Equations

2. Which of the following is the ordinate of the vertex of the function $f(x) = 2x^2 - 8x + 3$?

A) 2

B) 0.5

C) -5

D) -8

$x^2 - 2x - 1 = 0$

The equation above has solutions $x = n + \sqrt{k}$ and $x = n - \sqrt{k}$, where n and k are positive integers. What is the value of $n + k$?

A) $-\frac{5}{3}$

B) $-\frac{1}{3}$

C) $\frac{1}{3}$

D) $\frac{5}{3}$

$x^2 - 14x + 40 = 2x + 1$

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

A) -16

B) -14

C) 14

D) 16

What is the sum of all values of m that satisfy $2m^2 - 16m + 8 = 0$?

A) -8

B) $-4\sqrt{3}$

C) $4\sqrt{3}$

D) 8

$y = x^2 - 6x + 8$

The equation above represents a parabola in the xy-plane. Which of the following equivalent forms of the equation displays the x-intercepts of the parabola as constants or coefficients?

A) $y - 8 = x^2 - 6x$

B) $y + 1 = (x - 3)^2$

C) $y = x(x - 6) + 8$

D) $y = (x - 2)(x - 4)$

Complex

11. If $i = \sqrt{-1}$ which of the following is equivalent to

$$\frac{-3}{2-i} ? \frac{2+i}{2+i}$$

A) $\frac{3}{5}(2+i)$

B) $\frac{3}{5}(2+i)$

C) $-2-i$

D) $2+i$

If the expression above is written in the form $a + bi$, where a and b are constants, what is the value of b?

$$\frac{2i+1}{3i-2} \cdot \frac{3i+2}{3i+2}$$

A) $-\frac{4}{13}$

B) $\frac{4}{13}$

C) $-\frac{7}{13}$

D) $\frac{7}{13}$

Which of the following complex numbers is equivalent to $\frac{3-5i}{8+2i}$? (Note: $i = \sqrt{-1}$)

A) $\frac{3}{8} - \frac{5i}{2}$

B) $\frac{3}{8} + \frac{5i}{2}$

C) $\frac{7}{34} - \frac{23i}{34}$

D) $\frac{7}{34} + \frac{23i}{34}$

In the complex number system, which of the following is equal to $3i(1+i) - 1(1-i)^2$?

(Note: $i = \sqrt{-1}$)

A. $-3 + i$

B. $-3 + 5i$

C. $3 + i$

D. $3 + 5i$

Circles

In the *xy*-plane, the graph of $2x^2 - 6x + 2y^2 + 2y = 45$ is a circle. What is the radius of the circle?

A) 5

B) 6.5

C) $\sqrt{40}$

D) $\sqrt{50}$

$x^2 - 3x + y^2 + y = 22.5$

$r = \sqrt{\left(\frac{-3}{-2}\right)^2 + \left(\frac{1}{-2}\right)^2 + 22.5}$

$= 5$

$x^2 - 10x + y^2 + 6y = 2$

The graph in the *xy*-plane of the equation above is a circle. What are the coordinates of the center of the circle?

A) (−5, −3)

B) (−5, 3)

C) (5, −3)

D) (5, 3)

$\frac{-10}{-2}, \frac{6}{-2}$

$(5, -3)$

The graph of $x^2 - 4x + y^2 + 6y - 24 = 0$ in the *xy*-plane is a circle. What is the radius of the circle?

A) $2\sqrt{6}$

B) $\sqrt{11}$

C) $\sqrt{37}$

D) $\sqrt{76}$

$x^2 - 4x + y^2 + 6y = 24$

$r = \sqrt{\left(\frac{-4}{-2}\right)^2 + \left(\frac{6}{-2}\right)^2 + 24}$

$= \sqrt{37}$

Arcles

$(x-h)^2 + (y-K)^2 = r^2$

Center (h, K)

radius $= \sqrt{r^2}$

$x^2 + ax + y^2 + by = C$

$\left(\frac{a}{-2}, \frac{b}{-2}\right)$

$r = \sqrt{\left(\frac{a}{-2}\right)^2 + \left(\frac{b}{-2}\right)^2 + C}$

Which of the following equations describes a circle with radius 10 that passes through the origin when graphed in the *xy*-plane?

(0, 0)

A) $(x-5)^2 + (y+5)^2 = 10$

$(0-5)^2 + (0+5)^2 = 50$

B) $(x-5)^2 + (y+5)^2 = 100$

$(0-10)^2 + (0-10)^2 = 200$

C) $(x-10)^2 + (y-10)^2 = 100$

D) $(x-5\sqrt{2})^2 + (y+5\sqrt{2})^2 = 100$

$= r^2$

$= (10)^2$

$= 100$

$x^2 + y^2 + 4x - 2y = -1$

The equation of a circle in the *xy*-plane is shown above. What is the radius of the circle?

A) 2

B) 3

C) 4

D) 9

$\sqrt{\left(\frac{4}{-2}\right)^2 + \left(\frac{-2}{-2}\right)^2 + (-1)}$

$= 2$

$x^2 + 20x + y^2 + 16y = -20$

The equation above defines a circle in the *xy*-plane. What are the coordinates of the center of the circle?

A) (−20, −16)

B) (−10, −8)

C) (10, 8)

D) (20, 16)

$\frac{20}{-2}$

-10

Powers

Which of the following is an equivalent form of $\sqrt[3]{f^{6a}k^2}$, where $f>0$ and $k>0$?

A) $f^{\frac{1}{3a}}k^{-1}$

B) $f^{\frac{1}{2a}}k^{\frac{3}{2}}$

C) $f^{3a}k^{-1}$

D) $f^{2a}k^{\frac{2}{3}}$

If $3^x \cdot \sqrt[4]{3} = 9^{2x}$, then $x =$

A. 4

B. $\frac{1}{12}$

C. $\frac{4}{3}$

D. $\frac{-7}{4}$

If $(x^{2a-3})^2 = x^{14}$, then what is the value of a?

Which of the following is equal to $a^{\frac{2}{3}}$, for all values of a ?

A) $\sqrt{a^{\frac{1}{3}}}$

B) $\sqrt{a^3}$

C) $\sqrt[3]{a^{\frac{1}{2}}}$

D) $\sqrt[3]{a^2}$

If $27^{81} = 3^x$, what is the value of x?

A) 27

B) 84

C) 100

D) 243

System of equations

$$7x + 3y = 8$$
$$6x - 3y = 5$$

For the solution (x, y) to the system of equations above, what is the value of $x - y$?

A) $-\frac{4}{3}$

B) $\frac{2}{3}$

C) $\frac{4}{3}$

D) $\frac{22}{3}$

$$7x + 3y = 8$$
$$2x - 7y = 1$$

If (x, y) is the solution to the given system of equations, what is the value of x ?

$$x + 2y = 10$$
$$2x - y = 5$$

The solution to the given system of equations is (x, y). What is the value of $3x + y$?

A) 5

B) 7

C) 13

D) 15

$$ax + by = c$$
$$dx + ey = f$$

0 $\frac{a}{d} = \frac{b}{e}$

1 $\frac{a}{d} \neq \frac{b}{e}$

∞ $\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$

$$5x - y = 9$$
$$-60x + 12y = -108$$

How many solutions does the given system of equations have?

A) Zero

B) Exactly one

C) Exactly two

D) Infinitely many

$$2x + 3y = 5$$
$$4x + cy = 8$$

In the system of equations above, c is a constant. For what value of c will there be no solution (x, y) to the system of equations?

A) 3

B) 4

C) 5

D) 6

A farmer sold 108 pounds of produce that consisted of z pounds of zucchini and c pounds of cucumbers. The farmer sold the zucchini for \$1.69 per pound and the cucumbers for \$0.99 per pound and collected a total of \$150.32. Which of the following systems of equations can be used to find the number of pounds of zucchini that were sold?

A) $z + c = 150.32$, $1.69z + 0.99c = 108$

B) $z + c = 108$, $1.69z + 0.99c = 150.32$

C) $z + c = 108$, $0.99z + 1.69c = 150.32$

D) $z + c = 150.32$, $0.99z + 1.69c = 108$