

# College Level Algebra

Answer the questions without using a calculator.

1. Add:  $\frac{1}{a+1} + \frac{1}{a}$

a.  $\frac{2}{2a+1}$

b.  $\frac{2a+1}{a^2+a}$

c.  $\frac{2}{3a}$

d.  $\frac{1}{a^2+a}$

2. Find the Least Common Denominator of:  $\frac{1}{x^2+x}$ ,  $\frac{1}{x^2-1}$  and  $\frac{1}{x^3-x}$

a.  $x^3+2x^2-1$

b.  $x^7-1$

c.  $(x^2+x)(x^2-1)(x^3-x)$

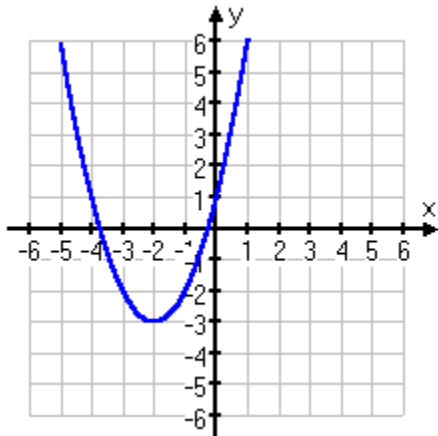
d.  $x(x+1)(x-1)$

$$\frac{a + \frac{1}{a}}{\frac{1}{a}}$$

3. Simplify:

- a.  $a^2 + 1$
- b.  $a + 1$
- c.  $a^2$
- d.  $1$

4. Find the equation of the given graph:



- a.  $y = (x + 3)^2 - 2$
- b.  $y = (x - 3)^2 + 2$
- c.  $y = (x + 2)^2 - 3$
- d.  $y = (x - 2)^2 + 3$

5. Find one of the solutions to the quadratic equation:  $x^2 - 4x + 5 = 0$

- a.  $4$
- b.  $-5$
- c.  $2 + i$
- d.  $5 + i$

6. Given:  $f(x) = 2x^2 - x + 1$

Find:  $f(x^{1/2})$

a.  $x - \frac{1}{2}x + 1$

b.  $2fx^2 - fx + f$

c.  $\sqrt{x} + 1$

d.  $2x - \sqrt{x} + 1$

7. Given:  $f(x) = 3x - 2$

Find:  $f^{-1}(4)$

a. 2

b. 4

c. 5

d. 10

8.  $\log_5 \frac{1}{5} = ?$

a. 1

b. -1

c. 5

d. -5

## College Level Algebra Answers

1. Answer: b

2. Answer: d

3. Answer: a

4. Answer: c

5. Answer: c

6. Answer: d

7. Answer: a

8. Answer: b

## College Level Algebra Solutions

1. Find the LCD:  $a(a + 1)$

Rewrite each term with the same LCD and add:

$$\begin{aligned} & \frac{1}{a+1} + \frac{1}{a} \\ &= \frac{a}{a} \cdot \frac{1}{a+1} + \frac{1}{a} \cdot \frac{a+1}{a+1} \\ &= \frac{a}{a(a+1)} + \frac{a+1}{a(a+1)} \\ &= \frac{a+a+1}{a(a+1)} \\ &= \frac{2a+1}{a(a+1)} \\ &= \frac{2a+1}{a^2+a} \end{aligned}$$

2. Find the Least Common Denominator of:  $\frac{1}{x^2+x}$ ,  $\frac{1}{x^2-1}$  and  $\frac{1}{x^3-x}$   
Factor each denominator:

$$x^2 + x = \underline{x} (x + 1)$$

$$x^2 - 1 = (\underline{x+1}) (x - 1)$$

$$x^3 - x = x(x^2 - 1) = \underline{x} (\underline{x+1}) (\underline{x-1})$$

The LCD is the product of the underlined factors:  $x(x+1)(x-1)$

3. Multiply the numerator and denominator by  $a$  and simplify:

$$\begin{aligned}\frac{a + \frac{1}{a}}{\frac{1}{a}} \cdot \frac{a}{a} &= \frac{\left(a + \frac{1}{a}\right)a}{\frac{1}{a} \cdot a} \\ &= \frac{a \cdot a + \frac{1}{a} \cdot a}{1} \\ &= a^2 + 1\end{aligned}$$

4. The given graph is a graph of the parabola  $y = x^2$  that has been translated to the left by 2 units and downward by 3 units.

A general equation for a parabola with its vertex at  $(h, k)$  is:  $y = (x - h)^2 + k$

Equation is:  $y = (x - (-2))^2 - 3$

Final answer:  $y = (x + 2)^2 - 3$

5. Find one of the solutions to the quadratic equation:  $x^2 - 4x + 5 = 0$

Use the quadratic formula to solve the quadratic equation

$$\begin{aligned}x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ a = 1, b = -4, c = 5 \\ x &= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(5)}}{2(1)} \\ &= \frac{4 \pm \sqrt{16 - 20}}{2} \\ &= \frac{4 \pm \sqrt{-4}}{2} \\ &= \frac{4 \pm 2i}{2} \\ &= 2 \pm i\end{aligned}$$

From the choices given, the final answer is:  $2 + i$

6. Given:  $f(x) = 2x^2 - x + 1$

Find:  $f(x^{1/2})$

$$\begin{aligned} f\left(x^{1/2}\right) &= 2\left(x^{1/2}\right)^2 - \left(x^{1/2}\right) + 1 \\ &= 2x - \sqrt{x} + 1 \end{aligned}$$

7. Given:  $f(x) = 3x - 2$

Find:  $f^{-1}(4)$

Method 1: Find the inverse function,  $f^{-1}(x)$  and then evaluate  $f^{-1}(4)$ .

Method 2: The range of the original function is the domain of its inverse.

Therefore, find  $x$  when  $f(x) = 4$ :

$$4 = 3x - 2 \text{ and solve for } x.$$

$$x = 2$$

Final answer:  $f^{-1}(4) = 2$  because  $f(2) = 4$

8.

$$\begin{aligned} \log_5 \frac{1}{5} &= \log_5 5^{-1} \\ &= -1 \cdot \log_5 5 \\ &= -1 \cdot 1 \\ &= -1 \end{aligned}$$