

# ALGEBRA 2 REVIEW FOR UNIT 3 EXAM

What do you need help with?	Try these problems:
Do you need more practice solving a 3x3 System of Linear Equations?	<p>1. Solve the following system of equations algebraically for all values of <math>x, y,</math> and <math>z</math>:</p> $\begin{aligned} 2x + 3y - 4z &= -1 \\ x - 2y + 5z &= 3 \\ -4x + y + z &= 16 \end{aligned}$ <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <math display="block">\begin{aligned} -2(x - 2y + 5z &amp;= 3) \\ \hookrightarrow -2x + 4y - 10z &amp;= -6 \\ 2x + 3y - 4z &amp;= -1 \\ \hline 7y - 14z &amp;= -7 \end{aligned}</math>   <math display="block">\begin{aligned} 7y - 14z &amp;= -7 \\ -7y + 21z &amp;= 28 \\ \hline 7z &amp;= 21 \\ \boxed{z = 3} \end{aligned}</math>   <math display="block">\begin{aligned} x - 2y + 5z &amp;= 3 \\ x - 2(5) + 5(3) &amp;= 3 \\ x - 10 + 15 &amp;= 3 \\ x + 5 &amp;= 3 \\ \begin{array}{r} -5 &amp; -5 \\ \hline \end{array} \\ \boxed{x = -2} \end{aligned}</math> </div> <div style="width: 45%;"> <math display="block">\begin{aligned} 4(x - 2y + 5z &amp;= 3) \\ \hookrightarrow 4x - 8y + 20z &amp;= 12 \\ -4x + y + z &amp;= 16 \\ \hline -7y + 21z &amp;= 28 \end{aligned}</math>   <math display="block">\begin{aligned} 7y - 14z &amp;= -7 \\ 7y - 14(3) &amp;= -7 \\ 7y - 42 &amp;= -7 \\ \begin{array}{r} \phantom{7y} &amp; -42 &amp; +42 \\ \hline \end{array} \\ 7y &amp;= 35 \\ \boxed{y = 5} \end{aligned}</math> </div> </div> <div style="text-align: right; margin-top: 20px;"> <p><math>(-2, 5, 3)</math></p> <p><u>Checks</u></p> <math display="block">\begin{aligned} 2(-2) + 3(5) - 4(3) &amp;= -1 \\ -4 + 15 - 12 &amp;= -1 \\ 11 - 12 &amp;= -1 \\ -1 &amp;= -1 \checkmark \end{aligned}</math>   <math display="block">\begin{aligned} -2 - 2(5) + 5(3) &amp;= 3 \\ -2 - 10 + 15 &amp;= 3 \\ -12 + 15 &amp;= 3 \\ 3 &amp;= 3 \checkmark \end{aligned}</math>   <math display="block">\begin{aligned} -4(-2) + (5) + 3 &amp;= 16 \\ 8 + 5 + 3 &amp;= 16 \\ 13 + 3 &amp;= 16 \\ 16 &amp;= 16 \checkmark \end{aligned}</math> </div>
	<p>2. Solve the following system of equations algebraically for all values of <math>x, y,</math> and <math>z</math>:</p> $\begin{aligned} 4x - y + 3z &= 12 & (4) \\ 2x + 9z &= -5 \\ x + 4y + 6z &= -32 & (z) \end{aligned}$ <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>1) <math>(2, -7, -1)</math></p> <p>2) <math>(2, 7, 1)</math></p> </div> <div style="width: 30%;"> <p>3) <math>(2, 7, -1)</math></p> <p>4) <math>(2, -7, 1)</math></p> </div> <div style="width: 30%;"> <math display="block">\begin{aligned} 16x - 4y + 12z &amp;= 48 \\ x + 4y + 6z &amp;= -32 \\ \hline 17x + 18z &amp;= 16 \\ -4x + 18z &amp;= 10 \\ \hline 13x &amp;= 26 \\ \frac{13}{13} \frac{x}{13} &amp;= \frac{26}{13} \\ \boxed{x = 2} \end{aligned}</math>   <math display="block">\begin{aligned} 2 + 4y + 6(-1) &amp;= -32 \\ 2 + 4y - 6 &amp;= -32 \\ 4y - 4 &amp;= -32 \\ \begin{array}{r} 4y &amp; -4 &amp; +4 \\ \hline \end{array} \\ 4y &amp;= -28 \\ \boxed{y = -7} \end{aligned}</math>   <math display="block">\begin{aligned} -4(2) - 18z &amp;= 10 \\ -8 - 18z &amp;= 10 \\ \begin{array}{r} +8 &amp; +8 \\ \hline \end{array} \\ -18z &amp;= 18 \\ \frac{-18}{18} \frac{z}{18} &amp;= \frac{18}{18} \\ \boxed{z = -1} \end{aligned}</math> </div> </div> <p style="text-align: center;"><math>(2, -7, -1)</math></p>

Do you need more practice solving a 2x2 System of Equations?

1. Solve the following system of equations algebraically.  $x^2 + y^2 = 400$

$$y = (x - 28)$$

$$x^2 + (x - 28)^2 = 400$$

$$x^2 + (x - 28)(x - 28) = 400$$

$$x^2 + x^2 - 28x - 28x + 784 = 400$$

$$2x^2 - 56x + 384 = 0$$

$$2(x^2 - 28x + 192) = 0$$

$$x = 16$$

$$y = 16 - 28$$

$$y = -12$$

$$(16, -12)$$

$$x = 12$$

$$y = 12 - 28$$

$$y = -16$$

$$(12, -16)$$

$$x = \frac{-(-28) \pm \sqrt{(-28)^2 - 4(1)(192)}}{2(1)}$$

$$x = \frac{28 \pm \sqrt{784 - 768}}{2}$$

$$x = \frac{28 \pm \sqrt{16}}{2}$$

$$x = \frac{28 \pm 4}{2}$$

$$\frac{28+4}{2} = \frac{32}{2} = 16$$

$$\frac{28-4}{2} = \frac{24}{2} = 12$$

2. The graphs of the equations  $y = x^2 + 4x - 1$  and  $y + 3 = x$  are drawn on the same set of axes. One solution of this system is

1)  $(-5, -2)$

3)  $(1, 4)$

2)  $(-1, -4)$

4)  $(-2, -1)$

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

$$y = x - 3$$

Type into  $y =$   
look at table

3. Solve the system of equations shown below algebraically.

$$x^2 + y^2 = 5$$

$$y = (2x)$$

$$x^2 + (2x)^2 = 5$$

$$x^2 + 4x^2 = 5$$

$$5x^2 = 5$$

$$x^2 = 1$$

$$x = \pm 1$$

$$x = 1$$

$$y = 2(1)$$

$$y = 2$$

$$(1, 2)$$

$$x = -1$$

$$y = 2(-1)$$

$$y = -2$$

$$(-1, -2)$$

Do you need more practice using 2<sup>nd</sup> TRACE 5 (intersection point on the calculator)?

1. If  $f(x) = 3|x| - 1$  and  $g(x) = 0.03x^3 - x + 1$ , an approximate solution for the equation  $f(x) = g(x)$  is

1) 1.96

~~3)  $(-0.99, 1.96)$~~

2) 11.29

4)  $(11.29, 32.87)$

2nd trace  
5 intersection

2. When  $g(x) = \frac{2}{x+2}$  and  $h(x) = \log(x+1) + 3$  are graphed on the same set of axes, which coordinates best approximate their point of intersection?

- 1) (-0.9, 1.8)
- 2) (-0.9, 1.9)
- 3) (1.4, 3.3)
- 4) (1.4, 3.4)

Do you need more practice solving polynomial equations?

1. Given  $c(m) = m^3 - 2m^2 + 4m - 8$ , the solution of  $c(m) = 0$  is

- 1)  $\pm 2$
- 2) 2 only
- 3)  $2i, 2$
- 4)  $\pm 2i, 2$

$$\begin{aligned}
 (m^3 - 2m^2) + 4m - 8 &= 0 \\
 m^2(m-2) + 4(m-2) &= 0 \\
 (m^2 + 4)(m-2) &= 0 \\
 m^2 + 4 = 0 & \quad m - 2 = 0 \\
 \sqrt{m^2} = \sqrt{-4} & \quad m = 2 \\
 m = \pm 2i &
 \end{aligned}$$

2. What are the zeros of  $P(m) = (m^2 - 4)(m^2 + 1)$ ?

$$\begin{aligned}
 (m-2)(m+2)(m^2+1) &= 0 \\
 m-2=0 & \quad m+2=0 & \quad m^2+1=0 \\
 m=2 & \quad m=-2 & \quad m^2=-1 \\
 & & \quad m = \pm\sqrt{-1} \\
 & & \quad m = \pm i
 \end{aligned}$$

$\{ \pm 2, \pm i \}$

3. Solve  $4x^3 - x^2 + 16x - 4 = 0$ .

$$\begin{aligned}
 (4x^3 - x^2) + 16x - 4 &= 0 \\
 x^2(4x-1) + 4(4x-1) &= 0 \\
 (x^2+4)(4x-1) &= 0 \\
 x^2+4=0 & \quad 4x-1=0 \\
 \sqrt{x^2} = \sqrt{-4} & \quad 4x=1 \\
 x = \pm 2i & \quad x = \frac{1}{4}
 \end{aligned}$$

$\{ \frac{1}{4}, \pm 2i \}$

4. Determine the zeros for  $f(x) = x^4 - 4x^3 - 9x^2 + 36x$ .

$$\begin{aligned}
 x^3(x-4) - 9x(x-4) & \\
 (x^3 - 9x)(x-4) & \\
 x(x^2 - 9)(x-4) & \\
 x(x-3)(x+3)(x-4) &= 0 \\
 x=0 & \quad x=3 \quad x=-3 \quad x=4
 \end{aligned}$$

$\{ \pm 3, 0, 4 \}$

5. Algebraically determine the roots, in simplest  $a + bi$  form to the equation below.

$$\begin{array}{r} x^2 - 2x + 7 = 4x - 10 \\ -4x + 10 \quad -4x + 10 \\ \hline \end{array}$$

$$x^2 - 6x + 17 = 0$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(17)}}{2(1)}$$

$$x = \frac{6 \pm \sqrt{36 - 68}}{2}$$

$$x = \frac{6 \pm \sqrt{-32}}{2}$$

$$x = \frac{6 \pm i\sqrt{16 \cdot 2}}{2}$$

$$x = \frac{6 \pm 4i\sqrt{2}}{2} \quad x = 3 \pm 2i\sqrt{2}$$

6. The solutions to the equation  $5x^2 - 2x + 13 = 9$  are

1)  $\frac{1}{5} \pm \frac{\sqrt{21}}{5}$

3)  $\frac{1}{5} \pm \frac{\sqrt{66}}{5}i$

2)  $\frac{1}{5} \pm \frac{\sqrt{19}}{5}i$

4)  $\frac{1}{5} \pm \frac{\sqrt{66}}{5}$

$$5x^2 - 2x + 4 = 0$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(5)(4)}}{2(5)}$$

$$x = \frac{2 \pm \sqrt{4 - 80}}{10}$$

$$x = \frac{2 \pm \sqrt{-76}}{10}$$

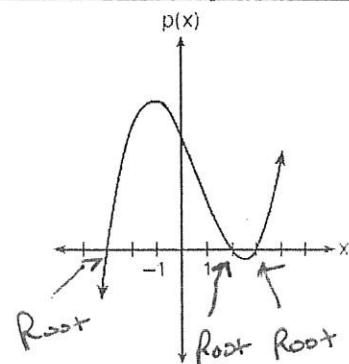
$$x = \frac{2 \pm i\sqrt{4 \cdot 19}}{10}$$

$$x = \frac{2 \pm 2i\sqrt{19}}{5 \cdot 2} \quad x = \frac{1 \pm i\sqrt{19}}{5}$$

Do you need more practice finding roots/zeros/etc. of polynomial functions?

The graph of the function  $p(x)$  is sketched below. Determine the roots.

$$x = -3, x = 2, x = 3$$



Do you need more practice *simplifying radicals*?

1.  $\sqrt{45a^7}$   $\sqrt{9 \cdot 5 \cdot a^4 \cdot a^3}$   
 $3a^3\sqrt{5a}$

2.  $\sqrt{12x^{20}y^8}$   $\sqrt{4 \cdot 3 \cdot x^{16} \cdot y^8}$   
 $2x^4y^2\sqrt{3}$

3.  $\sqrt{-100x^5y^4}$   $i\sqrt{100 \cdot x^4 \cdot x \cdot y^4}$   
 $10xy^2i\sqrt{x}$

4.  $-5\sqrt{-24x^7y^2}$   $(2) -5i\sqrt{4 \cdot 6 \cdot x^6 \cdot x \cdot y^2}$   
 $-10xy^2i\sqrt{6x}$

Do you need more practice *finding an inverse function*?

1. What is the inverse of the function  $y = 4x + 5$ ?

1)  $x = \frac{1}{4}y - \frac{5}{4}$       3)  $y = 4x - 5$        $x = 4y + 5$

2)  $y = \frac{1}{4}x - \frac{5}{4}$       4)  $y = \frac{1}{4x+5}$        $x - 5 = 4y$

Switch  $x \leftrightarrow y$   
 solve for  $y$

$\frac{1}{4}x - \frac{5}{4} = y$

Do you need more practice *finding the Average Rate Of Change (AROC)*?

1. The table below shows the number of hours of daylight on the first day for certain months in Rochester, NY.

Month	Hours of Daylight
Jan.	9.4
March	11.9
May	14.7
June	15.4
July	15.1
Aug.	13.9
Sept.	12.5

$AROC = \frac{13.9 - 9.4}{8 - 1} = \frac{4.5}{7}$

$AROC = .642857...$

$AROC = .643$

Given the data, what is the average rate of change in hours of daylight per month from January 1st to August 1st? *rounded to the nearest thousandth?*

