If a and b are the solutions of the given equation, find $|a - b|$.

$$\begin{vmatrix} x & 1 \\ x & 2x \end{vmatrix} = 3$$

Find the y-intercept of a line that has an x-intercept of 2 and is perpendicular to the line containing the points (-2,3) and (3,5).

If $\frac{4-3i}{2+i}$ is written in the form a + bi (where $a, b \in \Re$ and $i = \sqrt{-1}$),

find the sum $|a| + |b|$.

Find all real values of k such that the graph of $y = x^2 + 2kx + k$

does not intersect the x-axis.

Given: y varies directly as x and inversely as the square of z
y = 2 when x = 3 and z = 4

Find y when x = 9 and z = 2.

A rectangle is inscribed in an ellipse with equation $9x^2 + 25y^2 - 225 = 0$ in such a way that the foci of the ellipse lie on the rectangle. Find the area of this rectangle.

Solve over $\Re$: $\log_5(x-1)+\log_5(x-2)=\log_5(x+6)$

A line is tangent to the circle with equation $x^2+y^2-6x+4y-12=0$ at the point on the circle in the fourth quadrant where x =7. Find the equation of the tangent line in the form y = mx + b.

Find the numerical value of $\dfrac{x^4 - x^3 + x - 1}{x^3 - 2x^2 + 2x - 1}$ when x = 2008.

An alloy of gold and silver is 25% gold. To obtain an alloy that is 40% gold, 12 pounds of the old alloy must be removed and replaced by pure gold. Find the weight, in pounds, of the old alloy.

Find the sum of all the x and y coordinates of all points of intersection of the graphs of $x^2 + 2y^2 = 54$ and $2x - y = -9$.

A box contains 40 tickets numbered 1, 2, 3, 4, …, 40. If two tickets are drawn without replacement, find the probability that the sum of their numbers is even.