

Math 107 Exam #1

For  $5 < x < 10$  write the expression  $|x - 12| - |x - 4|$  without absolute values.

Simplify as much as possible. Write your answer as a single fraction with no negative exponents.

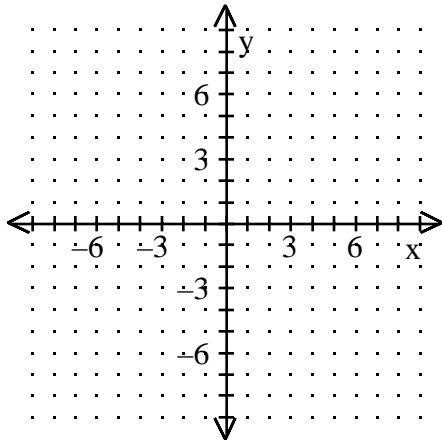
$$\frac{(x^{-1} + y^{-1})^2}{(x^{-2} + y^{-2})}$$

Factor  $25x^3y - 4xy^3 + 5x^2y + 2xy^2$  completely.

Find all real solutions of  $\frac{-2x}{4-x^2} + 1 = \frac{1}{x-2}$

Solve the equation  $\frac{ax+b}{cx-b} = \frac{d}{e}$  for the variable  $b$ .

Draw the graph of  $y = \begin{cases} -2x & \text{if } -4 < x < -1 \\ -|x| & \text{if } 0 < x < 3 \\ x & \text{if } 4 < x < 8 \end{cases}$



Find all values of  $k$  so that the point  $(-4,5)$  is on the graph of  $y = 2(x+k)^2 - 3$ .

Find the equation of the line that is perpendicular to the line  $2x - 3y = 5$  and has the same y-intercept as the line  $2x - 3y = 5$ .

Find the slope of the line through  $(-2, 1)$  and the highest point on the circle  $x^2 + y^2 - 6x + 2y - 6 = 0$ .

Find the perimeter of the triangle bounded by the y-axis and the lines  $2x + y = 3$  and  $4x - y = 6$ .

Find the point P on the curve  $y = \frac{1}{x}$  so that the line through P and  $(1,1)$  has slope  $-1/4$ .

Simplify without using absolute value:  $|x - 5| + |10 - x|$  where  $x > 10$ .

Find  $t$  so that the slope of the line through  $(3, -5)$  and  $(5, t)$  is 6.

Simplify:  $(x^{-1} + y)(xy^{-1} + x^2)^{-1}$

Find the perimeter of the triangle formed by the  $x$ -axis,  $y$ -axis and the line passing through  $(2, 6)$  and  $(4, 2)$ .

Solve for  $x$ :  $x(x - b) = c$

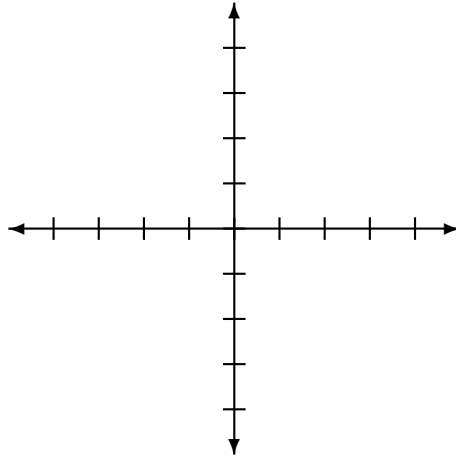
Find a point  $P$  on the curve  $y = \sqrt{x}$  such that the slope of the line through  $P$  and  $(1, 1)$  is  $\frac{1}{4}$ .

Solve for  $x$ :  $\frac{4}{x^2 - 4x} - \frac{x - 3}{x - 4} = \frac{1}{x}$

Find the  $x$ -intercept(s) of the circle with center  $(4, 2)$  and tangent to the  $y$ -axis.

Rewrite the following using one radical:  $\frac{\sqrt{\sqrt{A}\sqrt[3]{A}}}{\sqrt[4]{A}}$

Sketch the graph of the following function on the axis provided.  $f(x) = \begin{cases} 2x + 1 & \text{if } x < 0 \\ -\sqrt{x} & \text{if } x \geq 0 \end{cases}$



Find the equation of the line that is perpendicular to  $2x + 3y = 6$  and has the same  $y$ -intercept.

Solve for  $x$ :  $x^{5/2} - 4x^{1/2} = 0$

Find  $k$  so that the graph of  $y = k\sqrt[3]{x-3} - 5$  passes through the point  $(11, 3)$ .

Simplify:  $(y^2x^{-1} + x)(x - y^4x^{-3})^{-1}$

Find the perimeter of the triangle formed by the  $x$ -axis,  $y$ -axis and the line with slope  $-3$  passing through  $(2, 3)$ .

Solve for  $B$ :  $\frac{A}{B} + \frac{C}{5} = D$

Find the point(s)  $P$  on the curve  $y = x^2$  such that the second coordinate of the midpoint between  $P$  and  $(1, 1)$  is  $5$ .

Solve for  $x$ :  $\frac{x^2}{x^2 - 1} = \frac{4}{x + 1} + \frac{1}{x^2 - 1}$

Find the equation of the line that passes through the point  $(3, 7)$  and the  $y$ -intercept of the circle  $x^2 - 6x + y^2 + 4y + 4 = 0$ .

Simplify without using absolute value:  $|x - 7| + |3 - x|$  where  $3 < x < 7$ .

Rewrite  $\sqrt[3]{A^2}\sqrt{A^3}$  using a single radical.

Factor  $a^2 + 2ab + b^2 + a + b$

Find  $k$  if the graph of  $y = k(x + 1)^2 + 2$  passes through the point  $(1, 4)$ .

Find all real solutions of the equation  $\frac{4}{x^2 - 4x} - \frac{x - 3}{x - 4} = \frac{1}{x}$ .

Solve the equation  $a^2 + ax = b^2 - bx$  for  $x$  in terms of  $a$  and  $b$  if  $a \neq -b$ .

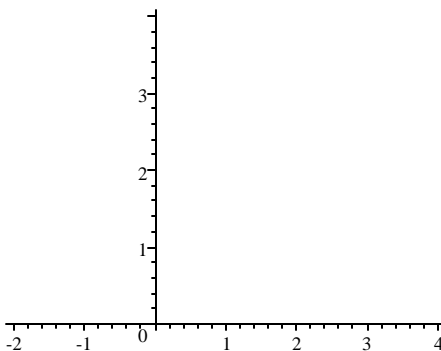
Simplify the expression  $\frac{(x^{-1} - y^{-1})^{-1}}{(x - y)^{-1}}$

A line passes through the points  $(1, 2)$  and  $(3, -5)$ . What is the area of the triangle formed by this line and the coordinate axes?

Sketch the graph of the piecewise defined equation

$$y = \begin{cases} -x + 2 & \text{if } x \leq 1 \\ \sqrt{x} & \text{if } x > 1 \end{cases}$$

on the given axes .



Find the equation of the circle with center  $(3, -2)$  and which passes through the point  $(2, 1)$ .

Simplify  $|x - 5| + |10 - x|$  if  $x < 5$ .

Find the equation of the line that is tangent to the circle  $x^2 + y^2 = 5$  at the point  $(1, 2)$ . *{Hint: The radius of a circle is perpendicular to the tangent line}*

Find  $k$  if the graph of  $y = 2(x + 1)^2 + k$  passes through the point  $(1, 4)$ .

Solve the equation  $x^{\frac{5}{2}} - 9x^{\frac{1}{2}} = 0$  for  $x$

Find the equation of the line that is perpendicular to the line  $y = -2x + 3$ , and also has the same  $y$ -intercept as this line.

Find the point  $P = (x, y)$  on the the graph of the equation  $y = 2x - 3$  such that the slope of the line through  $P$  and the point  $(0, 1)$  is  $-1$ .

Find all real solutions of the equation  $\frac{2}{2x^2 + 3x + 1} + \frac{4}{x + 1} = \frac{3}{2x + 1}$

Solve the equation  $\frac{1}{ax} = \frac{1}{bx} + \frac{1}{c}$  for  $x$  in terms of the other letters.

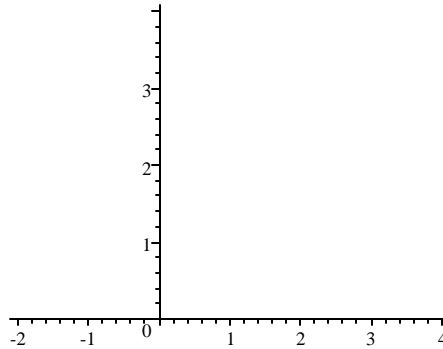
Simplify the expression  $\frac{x^{-1} + y^{-1}}{(x^{-1} + y^{-1})^{-1}}$

A line passes through the points  $(-3, 8)$  and  $(6, -4)$ . What is the perimeter of the triangle formed by this line and the coordinate axes?

Sketch the graph of the piece-wise defined equation

$$y = \begin{cases} 1 & \text{if } x \leq -2 \\ -x + 2 & \text{if } -2 < x \leq 1 \\ \sqrt{x} & \text{if } 1 < x \leq 4 \end{cases}$$

on the given axes .



Find the equation of the circle with center  $(1, -2)$  and which passes through the point  $(2, 1)$ .

Simplify  $|x - 5| + |10 - x|$  if  $x > 10$ .