Name _____ *Key*

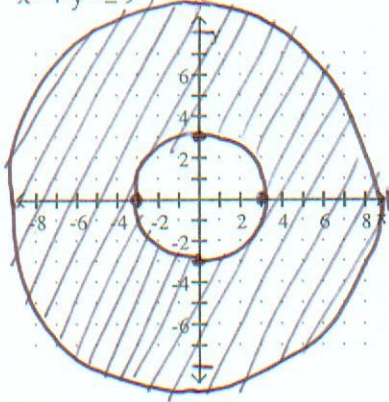**SHORT ANSWER.** Write the word or phrase that best completes each statement or answers the question.

Graph the solution set of the system of inequalities or indicate that the system has no solution.

1) $x^2 + y^2 \leq 81$

   $x^2 + y^2 \geq 9$

1) _____ ←

Solve the system by the substitution method.

2) $xy = 1$

   $-12x - y = -7$

2) $\left(\frac{1}{3}, 3\right), \left(\frac{1}{4}, 4\right)$

$$y = \frac{1}{x}$$

$$-12x - \frac{1}{x} = -7$$

$$-12x^2 - 1 = -7x$$

$$12x^2 - 7x + 1 = 0$$

$$(3x - 1)(4x - 1) = 0$$
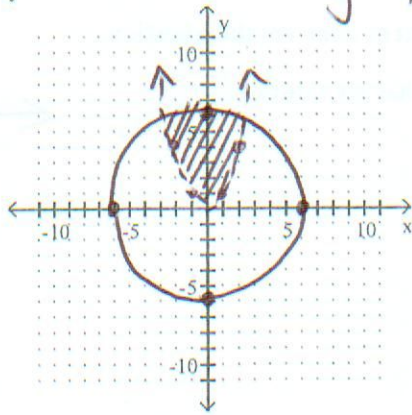
$$x = \frac{1}{3} \quad \bigg| \quad x = \frac{1}{4}$$

$$y = 3, 4$$

Graph the solution set of the system of inequalities or indicate that the system has no solution.

3) $x^2 + y^2 \leq 36$

$y - x^2 > 0$

$y > x^2$

Solve the system by the substitution method.

4) $x + y = 12$

$y = x^2 - 12x + 36$

$y = 12 - x$

$12 - x = x^2 - 12x + 36$

$0 = x^2 - 11x + 24$

$0 = (x - 8)(x - 3)$

$x = 8, 3$

$y = 4, 9$

4) $(8, 4), (3, 9)$

Write the partial fraction decomposition of the rational expression.

5) $\dfrac{3x + 7}{(x - 8)^2}$

$\dfrac{3x + 7}{(x - 8)^2} = \dfrac{A}{x - 8} + \dfrac{B}{(x - 8)^2}$

$3x + 7 = A(x - 8) + B$

$3x + 7 = Ax - 8A + B$

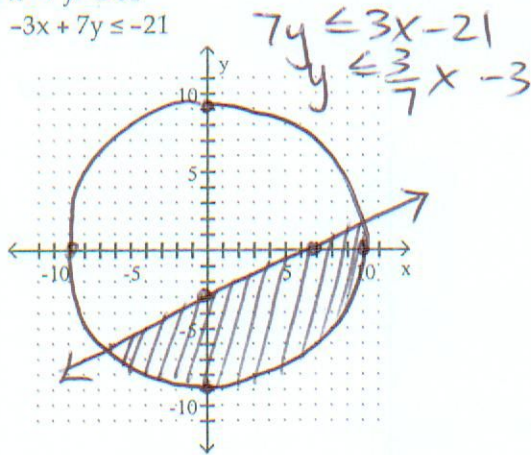$\boxed{3} = A$

$7 = -8A + B$

$7 = -8(3) + B$

$31 = B$

5) $\dfrac{3}{x - 8} + \dfrac{31}{(x - 8)^2}$

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Graph the solution set of the system of inequalities or indicate that the system has no solution.

6) $x^2 + y^2 \leq 81$
   $-3x + 7y \leq -21$

$7y \leq 3x - 21$
$y \leq \frac{3}{7}x - 3$

Solve the system by the addition method.

7) $x^2 + y^2 - 8x + 2y - 8 = 0$
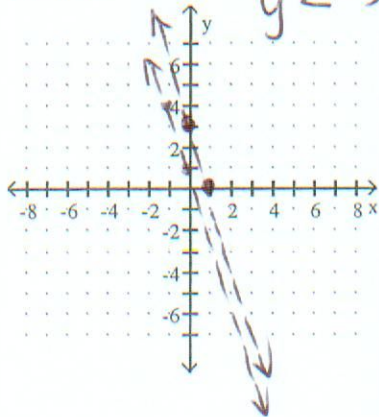
(+) $\underline{x^2 - y^2 - 8x - 2y - 10 = 0}$

$2x^2 - 16x - 18 = 0$

$x^2 - 8x - 9 = 0$

$(x-9)(x+1) = 0$

$x = 9, -1$

(-) $2y^2 + 4y + 2 = 0$

$y^2 + 2y + 1 = 0$

$(y+1)^2 = 0$

$y = -1$

$x^2 + (-1)^2 - 8x + 2(-1) - 8 = 0$

$x^2 + 1 - 8x - 2 - 8 = 0$

$x^2 - 8x - 9 = 0$

7) $\underline{(9, -1), (-1, -1)}$

Graph the solution set of the system of inequalities or indicate that the system has no solution.

8) $3x + y > 3$
   $3x + y < 1$

$y > -3x + 3$
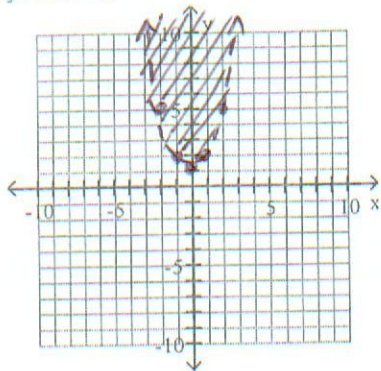$y < -3x + 1$

8) $\underline{no\ solution}$

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Graph the inequality.

9) $y > x^2 + 1$

Write the partial fraction decomposition of the rational expression.

10) $\dfrac{15x^2 - x - 20}{x(x + 1)(x - 1)} = \dfrac{A}{X} + \dfrac{B}{X+1} + \dfrac{C}{X-1}$

$15x^2 - x - 20 = A(x+1)(x-1) + B(x-1)x + Cx(x+1)$

$15x^2 - x - 20 = Ax^2 - A + Bx^2 - Bx + Cx^2 + Cx$

10) $\dfrac{20}{X} \dfrac{-2}{X+1} \dfrac{-3}{X-1}$

Solve the system by the addition method.

11) $\begin{cases} x^2 + y^2 = 16 \\ 16x^2 + 9y^2 = 144 \end{cases}$ $)(-9)$

$\begin{array}{r} -9x^2 - 9y^2 = -144 \\ 16x^2 + 9y^2 = 144 \\ \hline 7x^2 \qquad = 0 \end{array}$

$x^2 = 0$

$x = 0$

$y = \pm 4$

11) $(0, 4), (0, -4)$

$15 = A + B + C$

$-1 = -B + C$

$-20 = -A$

$20 = A$

$15 = 20 + B + C$

$-1 = \quad -B + C$

$\underline{(+) -5 = B + C}$

$-6 = 2C$

$-3 = C$

$-1 = -B - 3$

$2 = -B$

$-2 = B$

4

Graph the solution set of the system of inequalities or indicate that the system has no solution.
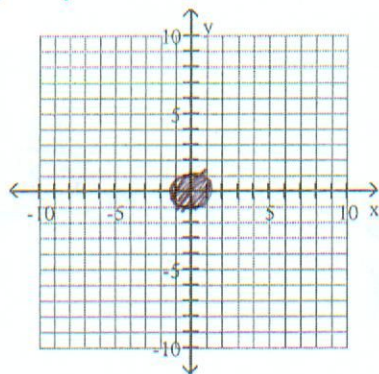
12) $y > x^2$

   $8x + 2y \leq 16$
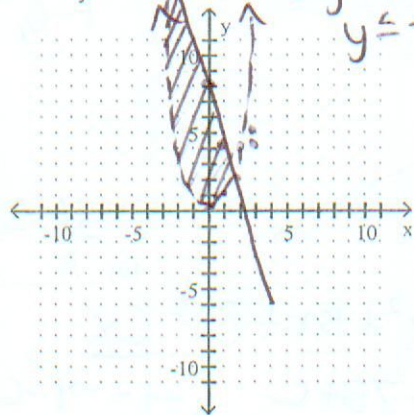
$2y \leq -8x + 16$

$y \leq -4x + 8$

12) _____

Graph the inequality.

13) $x^2 + y^2 \leq 1$

13) _____

Solve the system by the substitution method.

14) $y = x^2 - 13$

   $x^2 + y^2 = 25$

14) $(3, -4), (-3, -4)$

$(4, 3), (-4, 3)$

$x^2 + (x^2 - 13)^2 = 25$

$x^2 + x^4 - 26x^2 + 169 = 25$

$x^4 - 25x^2 + 144 = 0$

$(x^2 - 9)(x^2 - 16) = 0$

$x = 3, -3, 4, -4$

$x = 3: \quad y = 9 - 13$

$= -3: \quad y = 9 - 13$

$= 4: \quad y = 16 - 13$

$= -4:$

5

Solve the system by the addition method.

15) $x^2 + y^2 = 85$

$(+)\ \underline{x^2 - y^2 = -13}$

$2x^2 = 72$

$x^2 = 36$

$x = \pm\sqrt{36}$

$x = \pm 6$

$36 - y^2 = 13$

$-y^2 = -49$ (36)

$y^2 = 49$

$y = \pm 7$

15) $(6,7)(6,-7)$
$(-6,7),(-6,-7)$

Write the partial fraction decomposition of the rational expression.

16) $\dfrac{9x^2 - x - 16}{x^3 - x} = \dfrac{A}{X} + \dfrac{B}{X-1} + \dfrac{C}{X+1}$

$x(x^2-1)$

$x(x-1)(x+1)$

$9x^2 - x - 16 = Ax^2 - A + Bx^2 + Bx + Cx^2 - Cx$

$9 = A + B + C$

$-1 = B - C$

$-16 = -A$

$16 = A$

$9 = 16 + B + C$

$-7 = B + C$

$(+)\ \underline{-1 = B - C}$

$-8 = 2B$

$-4 = B$

$-1 = -4 - C$

$3 = -C$

$-3 = C$

16) $\dfrac{16}{X} \dfrac{-4}{X-1} \dfrac{-3}{X+1}$

Solve by the method of your choice.

17) $x^3 + y = 0$

$(+)\ \underline{7x^2 - y = 0}$

$x^3 + 7x^2 = 0$

$x^2(x+7) = 0$

$x = 0, -7$

17) $(0,0)\ (-7,34)$

Write the partial fraction decomposition of the rational expression.

18) $\dfrac{x - 10}{(x-2)(x-4)} = \dfrac{A}{X-2} + \dfrac{B}{X-4}$

$X - 10 = A(x-4) + B(x-2)$

$X - 10 = Ax - 4A + Bx - 2B$

$(1 = A + B)$

$-10 = -4A - 2B$

$4 = 4A + 4B$

$-6 = 2B$

$B = -3$

$A = 4$

18) $\dfrac{4}{X-2} \dfrac{-3}{X-4}$

Solve by the method of your choice.

19) $x^2 + y^2 = 100$

$(-)\ \underline{(x-3)^2 + y^2 = 73}$

$x^2 - x^2 + 6x - 9 = 27$

$6x = 36$

$x = 6$

$y^2 = 64$

$y = \pm 8$

19) $(6,8),(6,-8)$

Write the partial fraction decomposition of the rational expression.

20) $\dfrac{x + 5}{x^3 - 2x^2 + x} = \dfrac{A}{X} + \dfrac{B}{X-1} + \dfrac{C}{(X-1)^2}$

$x(x^2 - 2x + 1)$

$x(x-1)(x-1)$

$X + 5 = A(x-1)^2 + Bx(x-1) + Cx$

$X + 5 = Ax^2 - 2Ax + A + Bx^2 - Bx + Cx$

$0 = A + B$

$1 = -2A - B + C$

$5 = A$

$-5 = B$

$1 = -2(5) - (-5) + C$

20) $\dfrac{5}{X} \dfrac{-5}{X-1} + \dfrac{6}{(X-1)^2}$

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