

Section 6.6 – Practice Problems

Find all the real solutions of the system of equations

1.  $2x^2 - y = 1$  and  $y = 5x + 2$

$$2x^2 - [5x + 2] - 1 = 0$$

$$2x^2 - 5x - 2 - 1 = 0$$

$$2x^2 - 5x - 3 = 0$$

$$(2x + 1)(x - 3) = 0$$

$$x = -\frac{1}{2} \text{ or } 3$$

$(-\frac{1}{2}, -\frac{1}{2})$   
 $(3, 17)$

2.  $x^2 - y = 3$  and  $y = 3x + 7$

$$x^2 - [3x + 7] = 3$$

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

$$x^2 - 3x - 10 = 0$$

$$(x - 5)(x + 2) = 0$$

$$x = 5$$

$$x = -2$$

$(5, 22)$   
 $(-2, 1)$

3.  $x^2 = 2y$  and  $y = x - \frac{1}{2}$

$$x^2 = 2(x - \frac{1}{2}) \rightarrow x^2 = 2x - 1$$

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

$$x = 1$$

$(1, \frac{1}{2})$

4.  $x^2 + y = 4$  and  $1 = 2x + y$

$$y = 1 - 2x$$

$$x^2 + 1 - 2x - 4 = 0$$

$$x^2 - 2x - 3 = 0$$

$$(x - 3)(x + 1)$$

$$x = 3$$

$$x = -1$$

$(3, -5)$   
 $(-1, 3)$

5.  $3x^2 - 10y = 5$  and  $x - y = -2$

$$3x^2 - 10(x+2) = 5 \quad y = x+2$$

$$3x^2 - 10x - 20 - 5 = 0 \quad x = 5$$

$$3x^2 - 10x - 25 = 0 \quad x = -\frac{5}{3}$$

$$x^2 - 10x - 75 = 0$$

$(5, 7)$   
 $(-\frac{5}{3}, \frac{1}{3})$

$$(x - \frac{15}{3})(x + \frac{5}{3}) = 0$$

$$(x - 5)(3x + 5) = 0$$

6.  $2x^2 - 3y = 2$  and  $x - 2y = -2$

$$2x^2 - 3(\frac{x}{2} + 1) = 2 \quad -2y = -x - 2$$

$$2x^2 - \frac{3x}{2} - 3 - 2 = 0 \quad y = \frac{x}{2} + 1$$

$$2x^2 - \frac{3x}{2} - 5 = 0$$

$$4x^2 - 3x - 10 = 0$$

$$x^2 - 3x - 40 = 0$$

$(2, 2)$   
 $(-\frac{5}{4}, \frac{3}{8})$

$$(x - \frac{8}{4})(x + \frac{5}{4}) = 0$$

$$(x - 2)(4x + 5) = 0$$

7.  $x^2 + 2y = -2$  and  $-2x + y = 1$

$$x^2 + 2(2x+1) = -2 \quad y = 2x+1$$

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

$(-2, -3)$

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

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

$$x = -2$$

8.  $x + y = 2$  and  $y = 1 - x^2$

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

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

NO SOLUTION

$$\frac{1 \pm \sqrt{1 - 4(1)(1)}}{2}$$

$$\frac{1 \pm \sqrt{1 - 4}}{2} = \frac{1 \pm \sqrt{-3}}{2}$$

9.  $y = x^2 - x$  and  $y = 2x$

$$2x = x^2 - x$$

$$x^2 - 3x = 0$$

$(0, 0)$   
 $(3, 6)$

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

$$x = 0$$

$$x = 3$$

10.  $y = x^2 - 6x$  and  $y = x - 12$

$$x - 12 = x^2 - 6x$$

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

$$(x-3)(x-4) = 0$$

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

$$x = 3$$

$$x = 4$$

11.  $y = x^2 + 8x - 10$  and  $y = 3x + 4$

$$x^2 + 8x - 10 = 3x + 4$$

$$x^2 + 8x - 3x - 10 - 4 = 0$$

$$x^2 + 5x - 14 = 0$$

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

$(-7, -17)$   
 $(2, 10)$

$$x = -7$$

$$x = 2$$

12.  $x^2 = y$  and  $1 = 2x - y$

$$1 = 2x - x^2$$

$$x^2 - 2x + 1$$

$$(x-1)^2$$

$$x = 1$$

$(1, 1)$

13.  $x^2 + y = 9$  and  $16 = 3x + 2y$

$$y = 9 - x^2$$

$$16 = 3x + 2(9 - x^2)$$

$$16 = 3x + 18 - 2x^2$$

$$2x^2 - 3x - 2 = 0$$

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

$$x = -\frac{1}{2} \quad x = 2$$

$(2, 5)$   
 $(-\frac{1}{2}, \frac{35}{4})$

14.  $x^2 - y = 10$  and  $2x - 3y = -10$

$$y = x^2 - 10$$

$$2x - 3(x^2 - 10) = -10$$

$$2x - 3x^2 + 30 = -10$$

$$-3x^2 + 2x + 40 = 0$$

$$3x^2 - 2x - 40 = 0$$

$$x^2 - 2x - 120 = 0$$

$$(x - \frac{12}{3})(x + \frac{10}{3}) = 0$$

$$(x - 4)(3x + 10) = 0$$

$$x = 4$$

$$x = -\frac{10}{3}$$

$(4, 6)$  and  $(-\frac{10}{3}, \frac{10}{9})$

15.  $y = x^2$  and  $x + y = 3$

$$x + x^2 = 3$$

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

$$\frac{-1 \pm \sqrt{1 - 4(1)(-3)}}{2}$$

$$\frac{-1 \pm \sqrt{13}}{2}$$

$(\frac{-1 + \sqrt{13}}{2}, \frac{7 - \sqrt{13}}{2})$  and  $(\frac{-1 - \sqrt{13}}{2}, \frac{7 + \sqrt{13}}{2})$

16.  $y + 2x^2 - 2 = 0$  and  $3y - x - 3 = 0$

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

$$y = \frac{1}{3}x + 3$$

$$3(-2x^2 + 2) - x - 3 = 0$$

$$-6x^2 + 6 - x - 3 = 0$$

$$-6x^2 - x + 3 = 0$$

$$6x^2 + x - 3 = 0$$

$$\frac{-1 \pm \sqrt{1 - 4(6)(-3)}}{12}$$

$$\frac{-1 + \sqrt{73}}{12} \text{ and } \frac{-1 - \sqrt{73}}{12}$$

$(\frac{-1 + \sqrt{73}}{12}, \frac{35 + \sqrt{73}}{36})$   
 $(\frac{-1 - \sqrt{73}}{12}, \frac{35 - \sqrt{73}}{36})$

17.  $y - x^2 = 0$  and  $x^2 - 2x + y = 6$

$$y = x^2$$

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

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

$$x^2 - x - 3 = 0$$

$$\frac{1 \pm \sqrt{1 - 4(1)(-3)}}{2}$$

$$\frac{1 \pm \sqrt{13}}{2}$$

$$\left( \frac{1 + \sqrt{13}}{2}, \frac{7 + \sqrt{13}}{2} \right)$$

$$\left( \frac{1 - \sqrt{13}}{2}, \frac{7 - \sqrt{13}}{2} \right)$$

18.  $2x^2 + y = 9$  and  $y - x^2 - 5x = 1$

$$y = -2x^2 + 9$$

$$-2x^2 + 9 - x^2 - 5x - 1 = 0$$

$$-3x^2 - 5x + 8 = 0$$

$$3x^2 + 5x - 8 = 0$$

$$x^2 + 5x - 24 = 0$$

$$\left(x + \frac{8}{3}\right)\left(x - 3\right) = 0$$

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

$$x = -\frac{8}{3} \quad x = 1$$

$$\left( -\frac{8}{3}, -\frac{47}{9} \right)$$

$$(1, 7)$$

19. Find all the points of intersection of the parabola  $y = x^2 - 4x + 2$  and the  $x$ -axis

$$y = x^2 - 4x + 2 \quad y = 0$$

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

$$\frac{4 \pm \sqrt{16 - 4(1)(2)}}{2}$$

$$\frac{4 \pm \sqrt{8}}{2}, \quad \frac{4 \pm 2\sqrt{2}}{2}$$

$$2 \pm \sqrt{2}$$

$$(2 + \sqrt{2}, 0)$$

$$(2 - \sqrt{2}, 0)$$

20. Find all the points of intersection of the parabola  $y = 75x^2 - 33x + 157$  and the  $y$ -axis

$$x = 0$$

$$y = 75(0)^2 - 33(0) + 157$$

$$y = 157$$

$$(0, 157)$$