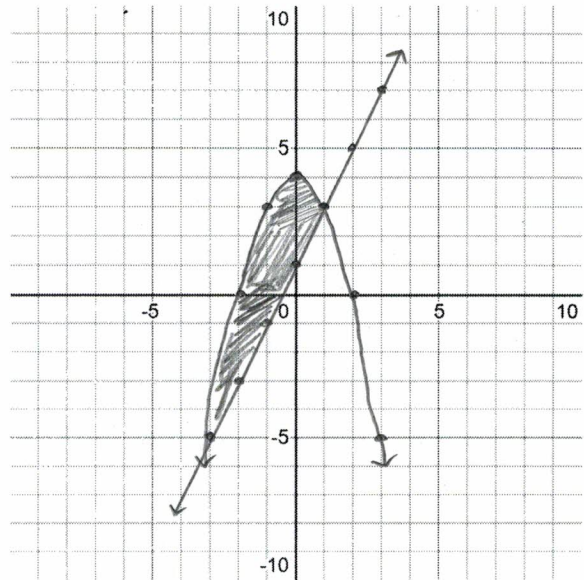


Section 5.4 – Practice Questions

Graph the system.

1. $y \leq 4 - x^2 \rightarrow y = -x^2 + 4$
 $y \geq 2x + 1$
 graph below
 or test
 point
 $0 \leq 4 - 0$
 $0 \leq 4$

↓
 slope $\frac{2}{1}$
 $y = mt + (0,1)$
 graph above



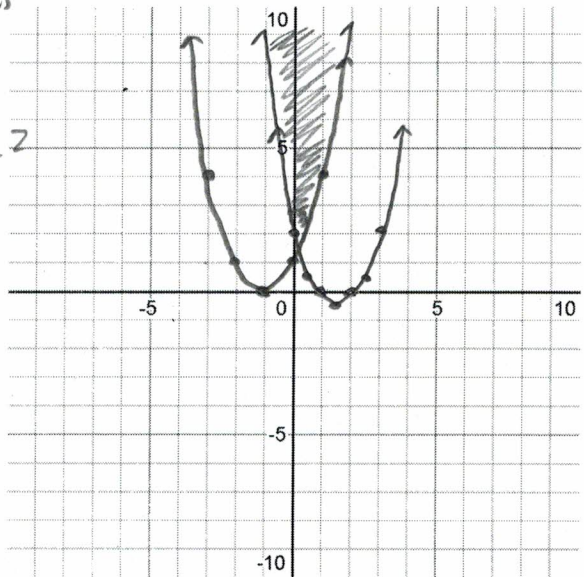
2. $y \geq x^2 - 3x + 2$ graph above (or inside)

$y \geq x^2 + 2x + 1$

$y = x^2 - 3x + 2 \rightarrow (x^2 - 3x + \frac{9}{4}) - \frac{9}{4} + 2$
 $= (x - 2)(x - 1) \quad (x - \frac{3}{2})^2 - \frac{1}{4}$

$x^2 + 2x + 1$
 $(x + 1)^2$
 graph
 inside

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



3. $y > x^2 - x$

$y \leq \frac{1}{2}x + 1$

$y = x(x-1)$

vertex

$x^2 - x + \frac{1}{4} - \frac{1}{4}$

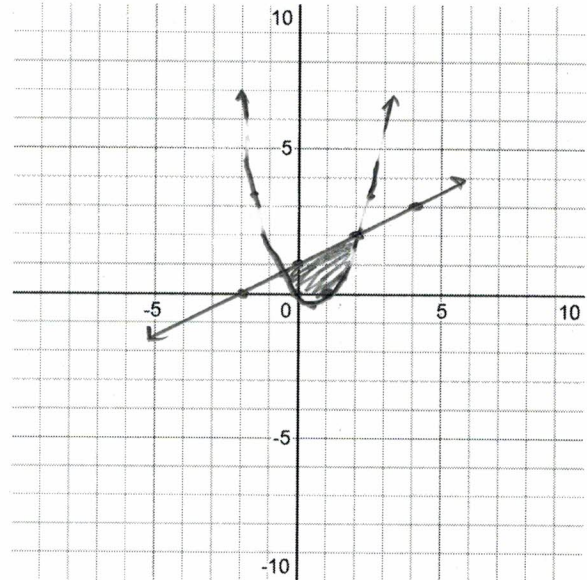
$(x - \frac{1}{2})^2 - \frac{1}{4}$

graph inside

slope $\frac{1}{2}$

y-int (0,1)

graph below



4. $y \geq x^2 - 2x - 3$

$y \geq -x + 2$

slope -1

y-int (0,2)

graph above

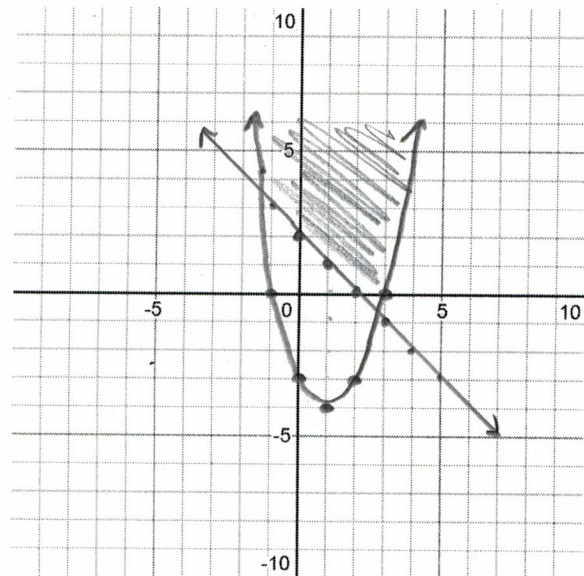
$y = (x-3)(x+1)$

vertex

$x^2 - 2x + 1 - 1 - 3$

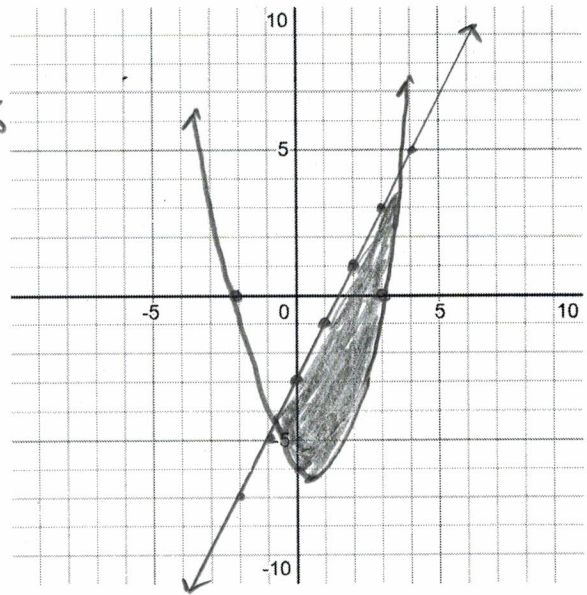
$(x-1)^2 - 4$

graph inside



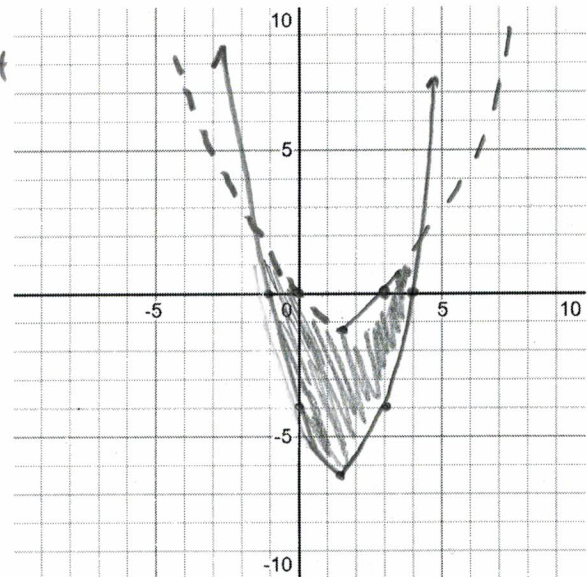
5. $y \geq x^2 - x - 6 \rightarrow (x-3)(x+2)$
 $y \leq 2x - 3$
 slope $\frac{2}{1}$
 y-int $(0, -3)$
 graph below

$x^2 - x + \frac{1}{4} - \frac{1}{4} - 6$
 $(x - \frac{1}{2})^2 - 6\frac{1}{4}$
 graph inside



6. $y \geq x^2 - 3x - 4 \rightarrow (x-4)(x+1)$
 $y < \frac{1}{2}x^2 - \frac{3}{2}x$

$x^2 - 3x + \frac{9}{4} - \frac{9}{4} - 4$
 $(x - \frac{3}{2})^2 - \frac{27}{4}$
 graph inside



$\frac{1}{2}x(x-3)$

$\frac{1}{2}(x^2 - 3x)$

$\frac{1}{2}(x^2 - 3x + \frac{9}{4} - \frac{9}{4})$

$\frac{1}{2}(x^2 - 3x + \frac{9}{4}) - \frac{9}{8}$

$\frac{1}{2}(x - \frac{3}{2})^2 - \frac{9}{8}$ $(\frac{3}{2}, -\frac{9}{8})$ vertex

graph outside

$$7. \quad y > x^2 - 2x - 3 \rightarrow (x-3)(x+1)$$

$$y < 2x^2 - 4x \quad \downarrow \quad x^2 - 2x + 1 - 1 - 3$$

$$(x^2 - 2x + 1) - 4$$

$$(x-1)^2 - 4$$

graph inside

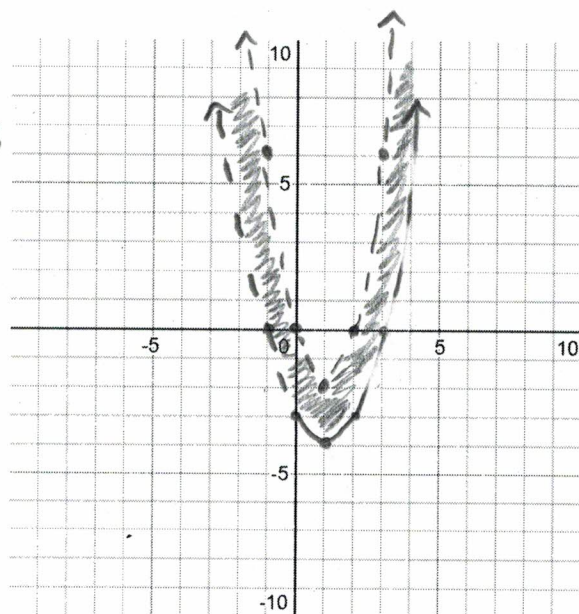
$$y = 2x(x-2)$$

$$2(x^2 - 2x)$$

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

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

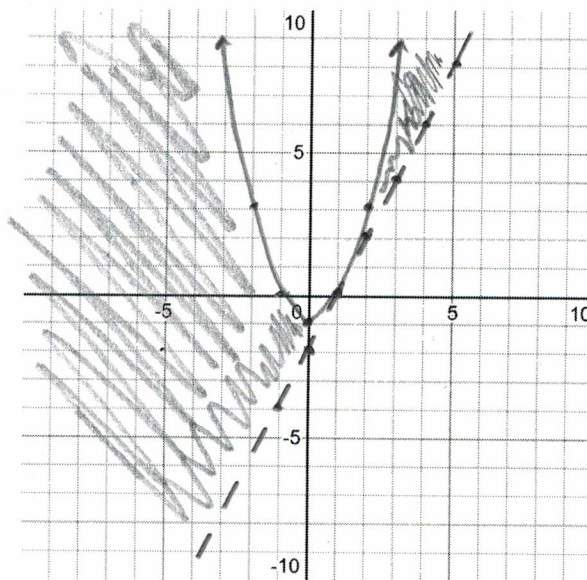
graph outside



$$8. \quad y \leq x^2 - 1 \quad \text{graph outside}$$

$$y > 2x - 2$$

graph above



Solve Each Inequality, Graph the Solution on the Number Line

9. $(x - 3)(x + 1) \geq 0$

R1: let $x = -3$

$(-3 - 3)(-3 + 1) \geq 0$

$(-6)(-2) \geq 0$
 $12 \geq 0 \checkmark$

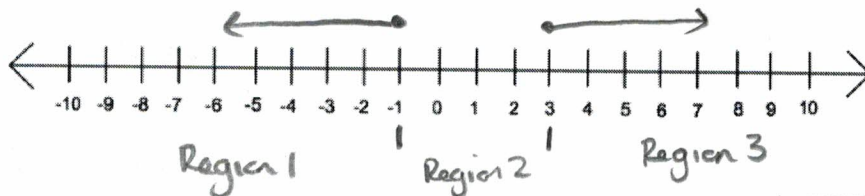
R2: let $x = 0$

$(-3)(1) \geq 0$
 $-3 \geq 0 \times$

R3: let $x = 5$

$(2)(6) \geq 0$
 $12 \geq 0 \checkmark$

$x \leq -1$
 $x \geq 3$



10. $(x + 1)(2x - 7) < 0$

$x = \frac{7}{2} = 3\frac{1}{2}$

R1: let $x = -2$

$(-1)(-8) < 0$
 $8 < 0 \times$

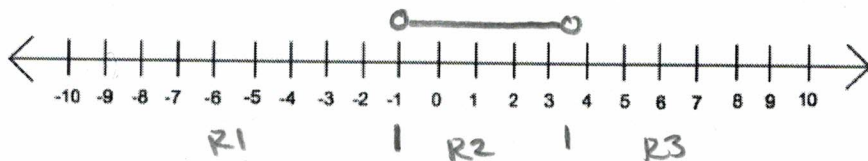
R2: let $x = 0$

$1(-7) < 0$
 $-7 < 0 \checkmark$

R3: let $x = 6$

$(7)(5) < 0$
 $35 < 0 \times$

$-1 < x < \frac{7}{2}$



11. $x(3x - 8) \leq 0$

$\frac{8}{3} = 2\frac{2}{3}$

R1: let $x = -1$

$-1(-11) \leq 0$
 $11 \leq 0 \times$

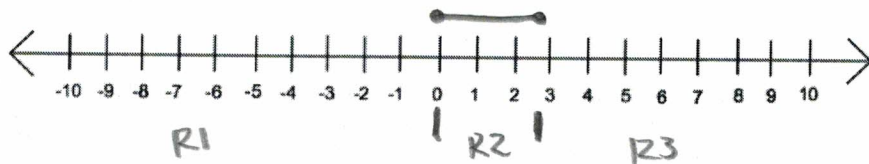
R2: let $x = 1$

$1(-5) \leq 0$
 $-5 \leq 0 \checkmark$

R3: let $x = 5$

$5(7) \leq 0$
 $35 \leq 0 \times$

$0 \leq x \leq \frac{8}{3}$



12. $(x - 1)(2x - 5) > 0$

$\frac{5}{2} = 2\frac{1}{2}$

R1: let $x = 0$

$(-1)(-5) > 0$
 $5 > 0 \checkmark$

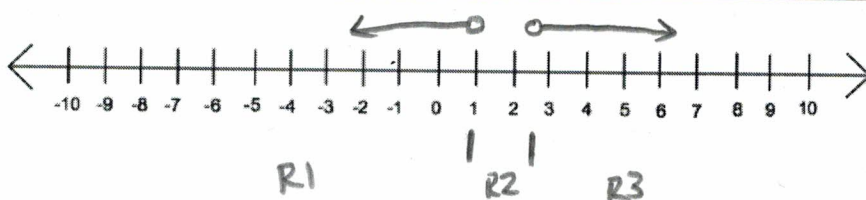
R2: let $x = 2$

$(1)(-1) > 0$
 $-1 > 0 \times$

R3: let $x = 5$

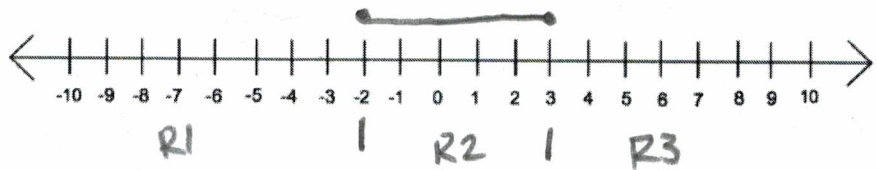
$(4)(5) > 0$
 $20 > 0 \checkmark$

$x < 1$
 $x > \frac{5}{2}$



13. $x^2 - x - 6 \leq 0$

$(x-3)(x+2)$



R1: Let $x = -3$

$(-6)(-1) \leq 0$
 $6 \leq 0 \times$

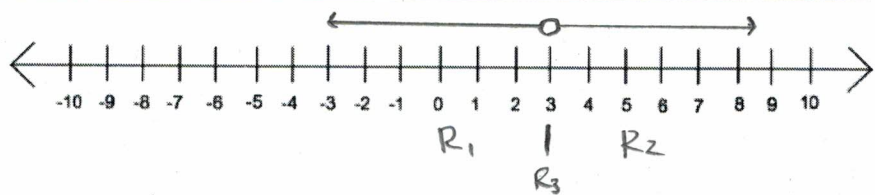
R2: Let $x = 0$
 $(-3)(2) \leq 0$
 $-6 \leq 0 \checkmark$

R3: Let $x = 5$
 $(2)(7) \leq 0$
 $14 \leq 0 \times$

$-2 \leq x \leq 3$

14. $(x-3)^2 > 0$

$x = 3$



R1: Let $x = 0$

$(-3)^2 > 0$
 $9 > 0 \checkmark$

R2: Let $x = 5$
 $(2)^2 > 0$
 $4 > 0 \checkmark$

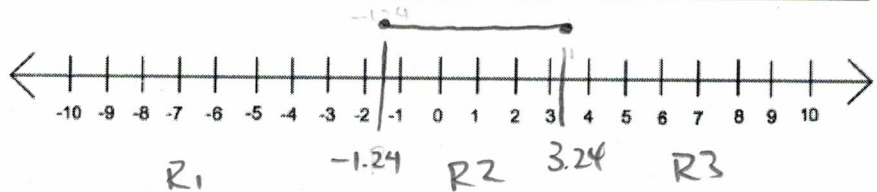
R3: Let $x = 3$
 $(3-3)^2 > 0$ $0 > 0 \times$ no

NOTE: If \geq then yes

so $x \neq 3$

15. $x^2 - 2x - 4 \leq 0$

can't factor
 so QE



$\frac{2 \pm \sqrt{4 - 4(1)(-4)}}{2}$
 $\frac{2 \pm \sqrt{20}}{2}$

Let $x = -3$
 $9 + 6 - 4 \leq 0$
 $11 \leq 0 \times$

Let $x = 0$
 $-4 \leq 0 \checkmark$

Let $x = 5$
 $25 - 10 - 4 \leq 0$
 $11 \leq 0 \times$

$\frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5} = 3.24$ or -1.24

$1 - \sqrt{5} \leq x \leq 1 + \sqrt{5}$

16. $2x^2 - 2\sqrt{2}x - 3 > 0$

QE

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

$2(2)$

$$\frac{2\sqrt{2} \pm \sqrt{8 - (-24)}}{4}$$

$$\frac{2\sqrt{2} \pm \sqrt{32}}{4}$$

$$= \frac{2\sqrt{2} \pm 4\sqrt{2}}{4} = \frac{6\sqrt{2}}{4} \text{ or } -\frac{2\sqrt{2}}{4}$$

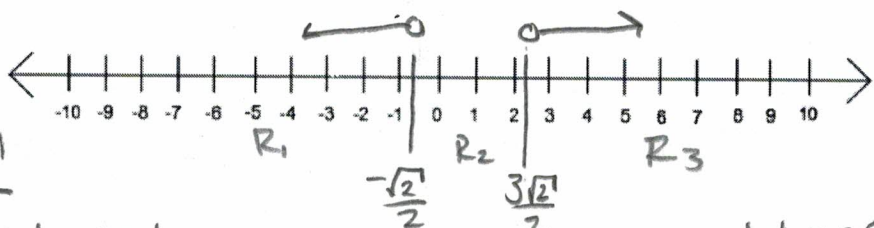
Let $x = -1$
 $2 + 2\sqrt{2} - 3 > 0$
 \checkmark

$\frac{3\sqrt{2}}{2}$ or $-\frac{\sqrt{2}}{2}$

Let $x = 0$
 $-3 > 0 \times$

Let $x = 5$
 $50 - 10\sqrt{2} - 3 > 0$
 \checkmark

$x < -\frac{\sqrt{2}}{2}$
 $x > \frac{3\sqrt{2}}{2}$



17. $2x^2 - 3x + 5 < 0$

QE

$$\frac{3 \pm \sqrt{9 - 4(2)(5)}}{2(2)}$$

$2(2)$

$$\frac{3 \pm \sqrt{-36}}{4}$$

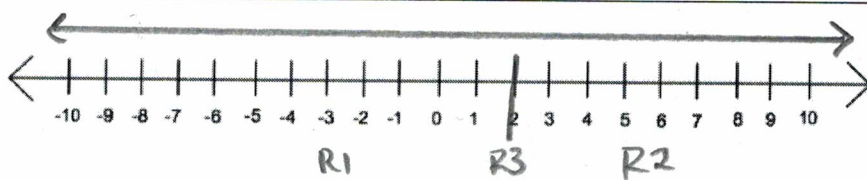
NOT POSSIBLE

NO SOLUTION



18. $x^2 - 2x + 4 \geq 0$

\downarrow
 $(x-2)^2 \geq 0$



Let $x = 0$
 $(-2)^2 \geq 0$

$4 \geq 0 \checkmark$

Let $x = 5$
 $9 \geq 0 \checkmark$

Let $x = 2$
 $0 \geq 0 \checkmark$

Anything for x

Answer Key – Section 5.4

1. <i>See Website Answer Key for Graphs</i>
2. <i>See Website Answer Key for Graphs</i>
3. <i>See Website Answer Key for Graphs</i>
4. <i>See Website Answer Key for Graphs</i>
5. <i>See Website Answer Key for Graphs</i>
6. <i>See Website Answer Key for Graphs</i>
7. <i>See Website Answer Key for Graphs</i>
8. <i>See Website Answer Key for Graphs</i>
9. $x \leq -1, x \geq 3$; <i>See Website for Graph</i>
10. $-1 < x < \frac{7}{2}$; <i>See Website for Graph</i>
11. $0 \leq x \leq \frac{8}{3}$; <i>See Website for Graph</i>
12. $x < 1, x > \frac{5}{2}$; <i>See Website for Graph</i>
13. $-2 \leq x \leq 3$; <i>See Website for Graph</i>
14. $x \neq 3$; <i>See Website for Graph</i>
15. $1 - \sqrt{5} \leq x \leq 1 + \sqrt{5}$; <i>See Website for Graph</i>
16. $x < -\frac{\sqrt{2}}{2}, x > \frac{3\sqrt{2}}{2}$ <i>See Website for Graph</i>
17. $x = \emptyset$; <i>See Website for Graph</i>
18. $x = \text{Anything}$

Extra Work Space