1. Simplify each of the following.

(a) $\dfrac{2}{3}-\dfrac{3}{5}\left(-\dfrac{1}{3}\right)^2=$

Solution: We apply the order of operations agreement. We start with the exponentiation.

$$\begin{aligned}
\frac{2}{3}-\frac{3}{5}\left(-\frac{1}{3}\right)^2 &= && \left(-\frac{1}{3}\right)^2=\frac{-1}{3}\cdot\frac{-1}{3}=\frac{1}{9}\\
\frac{2}{3}-\frac{3}{5}\cdot\frac{1}{9} &= && \text{multiplication: } \frac{3}{5}\cdot\frac{1}{9}=\frac{3\cdot 1}{5\cdot 9}=\frac{3}{45}=\frac{1}{15}\\
\frac{2}{3}-\frac{1}{15} &= && \text{common denominator is 15}\\
\frac{2\cdot 5}{3\cdot 5}-\frac{1}{15} &= &&\\
\frac{10}{15}-\frac{1}{15} &= && \frac{9}{15}=\frac{\not{3}\cdot 3}{\not{3}\cdot 5}=\frac{3}{5}\quad\spadesuit
\end{aligned}$$

(b) $||2-3^3|-4^2|=$

Solution: one trick here is to understand how the absolute value signs are paired. The first two can not be a pair, since there is nothin between them. Thus they must be the beginning of two different pairs. Then, as always, the first one to open is the last one to close.

$$\begin{aligned}
||2-3^3|-4^2| &= && \text{exponent in innermost parentheses}\\
||2-27|-4^2| &= && \text{subtraction in innermost parentheses}\\
||-25|-4^2| &= && \text{the absolute value of } -25 \text{ is } 25\\
|25-4^2| &= && \text{exponent}\\
|25-16| &= && \text{subtraction}\\
|9| &= && \text{the absolute value of 9 is 9}\\
&= && 9\quad\spadesuit
\end{aligned}$$

(c) $-|-5|=$

Solution: Two negatives do not always make a positive. This reads: the opposite of the absolute value of -5. Since the absolute value of -5 is 5, we have the opposite of 5, which is -5. ♠

2. Evaluate $15 - |-x - x^2 + 5|$ if

(a) $x = 0$

Solution: We first re-write the expression replacing the variables with parentheses. Then we copy the value of x into the parenthes. Then we work out the order of operations problem.

$$\begin{aligned}
15 - \left|-x - x^2 + 5\right| &= \\
15 - \left|-(\ \ ) - (\ \ )^2 + 5\right| &= \\
15 - \left|-(0) - (0)^2 + 5\right| &= && \text{exponent} \\
15 - |0 - 0 + 5| &= && \text{subtraction} \\
15 - |0 + 5| &= && \text{addition} \\
15 - |5| &= && \text{absolute value} \\
15 - 5 &= 10 && \spadesuit
\end{aligned}$$

(b) $x = 2$

Solution: We first re-write the expression replacing the variables with parentheses. Then we copy the value of x into the parenthes. Then we work out the order of operations problem.

$$\begin{aligned}
15 - \left|-x - x^2 + 5\right| &= \\
15 - \left|-(\ \ ) - (\ \ )^2 + 5\right| &= \\
15 - \left|-(2) - (2)^2 + 5\right| &= && \text{exponent} \\
15 - |-2 - 4 + 5| &= && \text{subtraction} \\
15 - |-6 + 5| &= && \text{addition} \\
15 - |-1| &= && \text{absolute value} \\
15 - 1 &= 14 && \spadesuit
\end{aligned}$$

(c) $x = -2$

Solution: We first re-write the expression replacing the variables with parentheses. Then we copy the value of x into the parenthes. Then we work out the order of operations problem.

$$\begin{aligned}
15 - \left|-x - x^2 + 5\right| &= \\
15 - \left|-(\ \ ) - (\ \ )^2 + 5\right| &= \\
15 - \left|-(-2) - (-2)^2 + 5\right| &= && \text{exponent} \\
15 - |2 - 4 + 5| &= && \text{subtraction} \\
15 - |-2 + 5| &= && \text{addition} \\
15 - |3| &= && \text{absolute value} \\
15 - 3 &= 12 && \spadesuit
\end{aligned}$$

(d) $x = \frac{1}{2}$

Solution: We first re-write the expression replacing the variables with parentheses. Then we copy the value of x into the parenthes. Then we work out the order of operations problem.

$$\begin{aligned}
15 - \left|-x - x^2 + 5\right| &= \\
15 - \left|-(\ \ ) - (\ \ )^2 + 5\right| &= \\
15 - \left|-\left(\frac{1}{2}\right) - \left(\frac{1}{2}\right)^2 + 5\right| &= \qquad \text{exponent: } \left(\frac{1}{2}\right)^2 = \frac{1}{2}\cdot\frac{1}{2} = \frac{1\cdot 1}{2\cdot 2} = \frac{1}{4} \\
15 - \left|-\frac{1}{2} - \frac{1}{4} + 5\right| &= \qquad \text{subtraction: } -\frac{1}{2} - \frac{1}{4} = \frac{-2}{4} - \frac{1}{4} = \frac{-1-2}{4} = \frac{-3}{4} \\
15 - \left|-\frac{3}{4} + 5\right| &=
\end{aligned}$$

We will now perform the addition $-\frac{3}{4} + 5$:

$$\begin{aligned}
-\frac{3}{4} + 5 &= \frac{-3}{4} + \frac{5}{1} \quad \text{the common denominator is 4} \\
&= \frac{-3}{4} + \frac{5\cdot 4}{1\cdot 4} \\
&= \frac{-3}{4} + \frac{20}{4} = \frac{-3+20}{4} = \frac{17}{4}
\end{aligned}$$

So now we have

$$\begin{aligned}
15 - \left|\frac{17}{4}\right| &= \qquad \text{absolute value} \\
15 - \frac{17}{4} &= \\
\frac{15}{1} - \frac{17}{4} &= \qquad \text{common denominator is } 4 \\
\frac{15\cdot 4}{1\cdot 4} - \frac{17}{4} &= \\
\frac{60}{4} - \frac{17}{4} &= \frac{60-17}{4} = \frac{43}{4} \quad \spadesuit
\end{aligned}$$

3. Simplify each of the following algebraic expressions.

(a) $(a-2b)+(a+5b) =$

Solution: We add algebraic expressions by dropping the parentheses and combining like terms.

$$\begin{aligned}
(a-2b)+(a+5b) &= \\
a - 2b + a + 5b &= 2a + 3b \quad \spadesuit
\end{aligned}$$

(b) $(a-2b)-(a+5b)=$

Solution: We apply Mantra 1: To subtract is to add the opposite. We obtain the opposite of an algebraic expression by multiplying it by -1 and then applying the law of distributivity. The opposite of $a+5b$ is

$$-1(a+5b)=-a-5b$$

After we re-wrote the subtraction as adding the opposite, the problem is easy: we drop the parentheses and then combine like terms.

$$\begin{aligned}(a-2b)-(a+5b) &= \\ (a-2b)+(-a-5b) &= \\ a-2b+(-a)-5b &= -7b\end{aligned}$$

a disappeared since $a+(-a)=0$.

NOTE: There is another way to tackle subtraction of algebraic expressions: we write a multiplier 1 in front of the negative sign and then distribute.

$$\begin{aligned}(a-2b)-(a+5b) &= (a-2b)-1(a+5b) \\ &= a-2b-a-5b \\ &= -7b \quad \spadesuit\end{aligned}$$

(c) $(a+5b)-(a-2b)=$

Solution:

$$\begin{aligned}(a+5b)-(a-2b) &= \quad \text{to subtract is to add the opposite} \\ (a+5b)+(-a+2b) &= \quad \text{drop parentheses} \\ a+5b+(-a)+2b &= \quad \text{combine like terms} \\ &= 7b \quad \spadesuit\end{aligned}$$

(d) $2(a-2b)-3(a+5b)=$

Solution: we apply the law of distributivity and then combine like terms.

$$\begin{aligned}2(a-2b)-3(a+5b) &= \\ 2a-4b-3a-15b &= -a-19b \quad \spadesuit\end{aligned}$$

(e) $2(a+5b)-3(a-2b)=$

Solution: we apply the law of distributivity and then combine like terms.

$$\begin{aligned}2(a+5b)-3(a-2b) &= \\ 2a+10b-3a+6b &= -a+16b \quad \spadesuit\end{aligned}$$

4. Solve each of the following equations. Make sure to check your solutions.

(a) $\dfrac{3x-1}{5}-\dfrac{2x-5}{3}=x-6$

Solution:

$$\begin{aligned}\frac{3x-1}{5}-\frac{2x-5}{3} &= x-6 && \text{make everything a fraction}\\ \frac{3x-1}{5}-\frac{2x-5}{3} &= \frac{x-6}{1} && \text{common denominator is 15}\end{aligned}$$

We will bring both sides to the common denominator. Whatever we multiply the bottom of a fraction, we must multiply the bottom by the same number. Do not rush into distributing; just indicate the multiplication on the top for now.

$$\begin{aligned}\frac{3(3x-1)}{15}-\frac{5(2x-5)}{15} &= \frac{15(x-6)}{15} && \text{multiply both sides by 15}\\ 3(3x-1)-5(2x-5) &= 15(x-6) && \text{MOST IMPORTANT LINE to have! distribute}\\ 9x-3-10x+25 &= 15x-90 && \text{combine like terms}\\ -x+22 &= 15x-90 && \text{add } x\\ 22 &= 16x-90 && \text{add } 90\\ 112 &= 16x && \text{divide by 16}\\ 7 &= x\end{aligned}$$

We check: if $x=7$, then

$$\begin{aligned}\text{LHS} &= \frac{3(7)-1}{5}-\frac{2(7)-5}{3}=\frac{21-1}{5}-\frac{14-5}{3}=\frac{20}{5}-\frac{9}{3}=4-3=1\\ \text{RHS} &= 7-6=1\end{aligned}$$

Thus our solution, $x=7$ is correct. ♠

(b) $\dfrac{2x-7}{3}=-1$

Solution:

$$\begin{aligned}\frac{2x-7}{3} &= -1 && \text{multiply by 3}\\ 2x-7 &= -3 && \text{add 7}\\ 2x &= 4 && \text{divide by 2}\\ x &= 2\end{aligned}$$

We check:

$$\text{LHS}=\frac{2(2)-7}{3}=\frac{4-7}{3}=\frac{-3}{3}=-1=\text{RHS}$$

Thus our solution, $x=2$ is correct. ♠

(c) $5(x-2)-2(3x-1)=-3x-8$
Solution:

$$\begin{aligned} 5(x-2)-2(3x-1) &= -3x-8 && \text{distribute} \\ 5x-10-6x+2 &= -3x-8 && \text{combine like terms} \\ -x-8 &= -3x-8 && \text{add } 3x \\ 2x-8 &= -8 && \text{add } 8 \\ 2x &= 0 && \text{divide by } 2 \\ x &= 0 \end{aligned}$$

We check:

$$\begin{aligned} \text{LHS} &= 5(0-2)-2(3\cdot 0-1)=5(-2)-2(0-1)=5(-2)-2(-1) \\ &= -10-(-2)=-8 \\ \text{RHS} &= -3x-8=-3\cdot 0-8=0-8=-8 \end{aligned}$$

Thus our solution, $x=0$ is correct. ♠

(d) $3(x-4)-(2-2x)=5x+14$
Solution:

$$\begin{aligned} 3(x-4)-(2-2x) &= 5x+14 && \text{write 1 in front of the negative sign} \\ 3(x-4)-1(2-2x) &= 5x+14 && \text{distribute} \\ 3x-12-2+2x &= 5x+14 \\ 5x-14 &= 5x+14 && \text{subtract } 5x \\ -14 &= 14 \end{aligned}$$

Since x cancelled out, we are left with an unconditional statement. In this case, this unconditional statement is false. No value of x can make the statement $-14=14$ true. An equation of this type is called a contradiction and has no solution. ♠

(e) $2(4-x)-5(2x-1)=-13(x-1)+x$
Solution:

$$\begin{aligned} 2(4-x)-5(2x-1) &= -13(x-1)+x && \text{distribute} \\ 8-2x-10x+5 &= -13x+13+x && \text{combine like terms} \\ -12x+13 &= -12x+13 \end{aligned}$$

Since the two sides are identical, any value of x will make the last statement true. An equation of this type is called an identity, and all numbers are solutions of it. ♠

(f) $\frac{1}{5}x - \frac{2}{3} = \frac{26}{15}$

Solution:

$$\begin{aligned} \frac{1}{5}x - \frac{2}{3} &= \frac{26}{15} && \text{add } \frac{2}{3} \text{ to both sides} && \frac{26}{15} + \frac{2}{3} = \frac{26}{15} + \frac{2 \cdot 5}{3 \cdot 5} = \\ \frac{1}{5}x &= \frac{12}{5} && \text{divide by } \frac{1}{5} && \frac{26}{15} + \frac{10}{15} = \frac{36}{15} = \frac{\not{3} \cdot 12}{\not{3} \cdot 5} = \frac{12}{5} \\ x &= 12 && && \frac{\frac{12}{5}}{\frac{1}{5}} = \frac{12}{5} \cdot \frac{5}{1} = \frac{12 \cdot \not{5}}{1 \cdot \not{5}} = \frac{12}{1} = 12 \end{aligned}$$

We check: if $x = 12$, then

$$\begin{aligned} \text{LHS} &= \frac{1}{5} \cdot 12 - \frac{2}{3} = \frac{1}{5} \cdot \frac{12}{1} - \frac{2}{3} = \frac{12}{5} - \frac{2}{3} = \frac{12 \cdot 3}{5 \cdot 3} - \frac{2 \cdot 5}{3 \cdot 5} = \frac{36}{15} - \frac{10}{15} = \frac{26}{15} \\ \text{RHS} &= \frac{26}{15} \end{aligned}$$

Thus our solution, $x = 12$ is correct. ♠

5. Solve each of the following inequalities.

(a) $2a - 5 \geq -7$

Solution:

$$\begin{aligned} 2a - 5 &\geq -7 && \text{add } 5 \\ 2a &\geq -2 && \text{divide by } 2 \\ a &\geq -1 \end{aligned}$$

Thus the answer is $a \geq -1$. ♠

(b) $-2a + 15 < -19$

Solution:

$$\begin{aligned} -2a + 15 &< -19 && \text{subtract } 15 \\ -2a &< -34 && \text{divide by } -2 \text{ we must reverse the inequality sign} \\ a &> 17 && \text{since we divide by a negative number} \end{aligned}$$

Thus the answer is $a > 17$. ♠

6. Solve each of the following formulas.

(a) $P = 2a + 2b$ for b.

Solution:

$$\begin{aligned} P &= 2a+2b && \text{subtract } 2a \\ P-2a &= 2b && \text{divide by } 2 \\ \frac{P-2a}{2} &= b \end{aligned}$$

This is not the only form of the correct result. There are actually three forms,

$$b=\frac{P-2a}{2} \quad \text{and} \quad b=\frac{1}{2}P-a \quad \text{and} \quad b=\frac{P}{2}-a$$

To obtain the second form from the first one, we apply Mantra 2: To divide is to multiply by the reciprocal.

$$b=\frac{P-2a}{2}=\frac{1}{2}(P-2a)=\frac{1}{2}P+\frac{1}{2}(-2a)=\frac{1}{2}P+\left(-\frac{2a}{2}\right)=\frac{1}{2}P-a$$

The third form is clearly correct as well since

$$\frac{1}{2}P=\frac{1}{2}\cdot\frac{P}{1}=\frac{P}{2}$$

The answer is $b=\dfrac{P-2a}{2}$ or $b=\dfrac{1}{2}P-a$ or $b=\dfrac{P}{2}-a$. All three forms are correct. They are each useful in different situations, so it is good to know all of them. ♠

(b) $2x+3y=-6$ for y.

Solution:

$$\begin{aligned} 2x+3y &= -6 && \text{subtract } 2x \\ 3y &= -2x-6 && \text{divide by } 3 \\ y &= \frac{-2x-6}{3} \end{aligned}$$

$$y=\frac{-2x-6}{3}=\frac{-2x}{3}-\frac{6}{3}=\frac{-2x}{3}-2$$

The answer is $y=\dfrac{-2x-6}{3}$ or $y=-\dfrac{2x}{3}-2$ or $y=-\dfrac{2}{3}x-2$. ♠

(c) $3x-4y=24$ for y.

Solution:

$$\begin{aligned} 3x-4y &= 24 && \text{add } 4y \\ 3x &= 4y+24 && \text{subtract } 24 \\ 3x-24 &= 4y && \text{divide by } 4 \\ \frac{3x-24}{4} &= y \end{aligned}$$

$$y=\frac{3x-24}{4}=\frac{3x}{4}-\frac{24}{4}=\frac{3x}{4}-6$$

The answer is $y=\dfrac{3x-24}{4}$ or $y=\dfrac{3x}{4}-6$ or $y=\dfrac{3}{4}x-6$ ♠

7. Word Problems.

(a) One side of a rectangle is 5 in shorter than seven times another side. Find the sides if the perimeter of the rectangle is 166 in.

Solution: Let x denote the shorter side. Then the longer side is $7x-5$.

shorter side:	x
longer side:	$7x-5$

We obtain the equation by expressing the perimeter of the rectangle and solve for x.

$$\begin{aligned} 2\Big(\underbrace{x}_{\text{shorter side}}\Big)+2\Big(\underbrace{7x-5}_{\text{longer side}}\Big) &= 166 && \text{distribute} \\ 2x+14x-10 &= 166 && \text{combine like terms} \\ 16x-10 &= 166 && \text{add } 10 \\ 16x &= 176 && \text{divide by } 16 \\ x &= 11 \end{aligned}$$

We now interpret the result. If $x=11$, then

shorter side:	x	11
longer side:	$7x-5$	$7(11)-5=77-5=72$

Thus the sides of the rectangle are 11 in and 72 in long. We check against the conditions stated in the problem.

$$7(11\text{ in})-5\text{ in}=77\text{ in}-5\text{ in}=72\text{ in} \quad \checkmark$$

Thus the longer side is indeed 5 in shorter than 7 times the shorter side, and

$$P=2(11\text{ in})+2(72\text{ in})=22\text{ in}+144\text{ in}=166\text{ in} \quad \checkmark$$

the perimeter is 166 in. Thus our solution, 11 in by 72 in is correct. ♠

(b) The sum of two numbers is 23, their difference is 41. Find these numbers.

Solution: Let x denote the smaller number. Then the larger number is $x+41$.

smaller number:	x
larger number:	$x+41$

We obtain an equation by expressing the sum of the numbers, and solve for x.

$$\begin{aligned} \underbrace{x}_{\text{smaller number}}+\underbrace{x+41}_{\text{longer side}} &= 23 \\ 2x+41 &= 23 && \text{subtract } 41 \\ 2x &= -18 && \text{divide by } 2 \\ x &= -9 \end{aligned}$$

We now interpret the result. If $x=-9$, then

smaller number:	x	-9
larger number:	$x+41$	$-9+41=32$

We check:

$$\begin{aligned} 32-(-9) &= 41 \checkmark && \text{the difference works} \\ 32+(-9) &= 23 \checkmark && \text{the sum works} \end{aligned}$$

Thus our solution, -9 and 32 are correct. ♠

(c) The sum of three consecutive numbers is 51. Find these numbers.

Solution: Consecutive means numbers coming right one after the other, like 3, 4, and 5. Thus the word "consecutive" is just another way of saying that the difference between these numbers is 1. Let x denote the smallest number. Then the next one must be $x+1$, and the largest is $(x+1)+1 = x+2$.

smaller number:	x
larger number:	$x+1$
largest number:	$x+2$

We obtain an equation by expressing the sum of the numbers, and solve for x.

$$\begin{aligned} \underbrace{x}_{\text{smaller number}} + \underbrace{x+1}_{\text{middle number}} + \underbrace{x+2}_{\text{largets number}} &= 51 \\ 3x+3 &= 51 && \text{subtract 3} \\ 3x &= 48 && \text{divide by 3} \\ x &= 16 \end{aligned}$$

We now interpret the result. If $x = 16$, then

smaller number:	x	16
larger number:	$x+1$	$16+1=17$
largest number:	$x+2$	$16+2=18$

We check:

$$\begin{aligned} & 16,\ 17, \text{ and } 18 \text{ are cinsecutive } \checkmark \\ 16+17+18 &= 51 \qquad \text{the sum works } \checkmark \end{aligned}$$

Thus our solution, 16, 17, and 18 is correct. ♠

(d) Ann took four exams. Her scores on the first three exams were 63, 76, and 68. How many points did she earn on the fourth exam if her average is 71?

Solution: Let x denote the score of Ann's fourth exam. The equation will express the average.

$$\begin{aligned} \frac{63+76+68+x}{4} &= 71 && \text{simplify left-hand side by adding the three scores} \\ \frac{x+207}{4} &= 71 && \text{multiply by 4} \\ x+207 &= 284 && \text{subtract 207} \\ x &= 77 \end{aligned}$$

We check: the average of the four exams is

$$\text{Average} = \frac{63+76+68+77}{4} = 71 \qquad \checkmark$$

Thus our solution, 77 is correct. ♠

8. Consider the equations $2x - 3y = -6$ and $y = -x + 7$.

   (a) Graph these lines in the same coordinate system. Use your graph to find the coordinates where the points intersect.
   We first graph the line $2x - 3y = -6$.

$$\begin{aligned} \text{If } x &= 0,\ y = ? && \text{substitute } x = 0 \text{ into the equation of the line} \\ 2(0) - 3y &= -6 && \text{solve for } y \\ 0 - 3y &= -6 && \\ -3y &= -6 && \text{divide by } -3 \\ y &= 2 && \Longrightarrow \text{ we found } (0,2) \end{aligned}$$

$$\begin{aligned} \text{If } x &= 3,\ y = ? && \text{substitute } x = 3 \text{ into the equation of the line} \\ 2(3) - 3y &= -6 && \text{solve for } y \\ 6 - 3y &= -6 && \text{subtract } 6 \\ -3y &= -12 && \text{divide by } -3 \\ y &= 4 && \Longrightarrow \text{ we found } (3,4) \end{aligned}$$

$$\begin{aligned} \text{If } x &= -3,\ y = ? && \text{substitute } x = -3 \text{ into the equation of the line} \\ 2(-3) - 3y &= -6 && \text{solve for } y \\ -6 - 3y &= -6 && \text{add } 6 \\ -3y &= 0 && \text{divide by } -3 \\ y &= 0 && \Longrightarrow \text{ we found } (-3,0) \end{aligned}$$

$$\begin{aligned} \text{If } x &= 6,\ y = ? && \text{substitute } x = 6 \text{ into the equation of the line} \\ 2(6) - 3y &= -6 && \text{solve for } y \\ 12 - 3y &= -6 && \text{subtract } 12 \\ -3y &= -18 && \text{divide by } -3 \\ y &= 6 && \Longrightarrow \text{ we found } (6,6) \end{aligned}$$

$$\begin{aligned} \text{If } x &= -6,\ y = ? && \text{substitute } x = -6 \text{ into the equation of the line} \\ 2(-6) - 3y &= -6 && \text{solve for } y \\ -12 - 3y &= -6 && \text{add } 12 \\ -3y &= 6 && \text{divide by } -3 \\ y &= -2 && \Longrightarrow \text{ we found } (-6,-2) \end{aligned}$$

We graph the points $(0,2)$, $(3,4)$, $(-3,0)$, $(6,6)$, and $(-6,2)$ and connect the points. (Green line.)

We now graph the line $y=-x+7$.

$$\begin{aligned} \text{If } x &= 0,\ y=? && \text{substitute } x=0 \text{ into the equation of the line} \\ y &= -(0)+7=0+7=7 && \Longrightarrow \text{ we found } (0,7) \end{aligned}$$

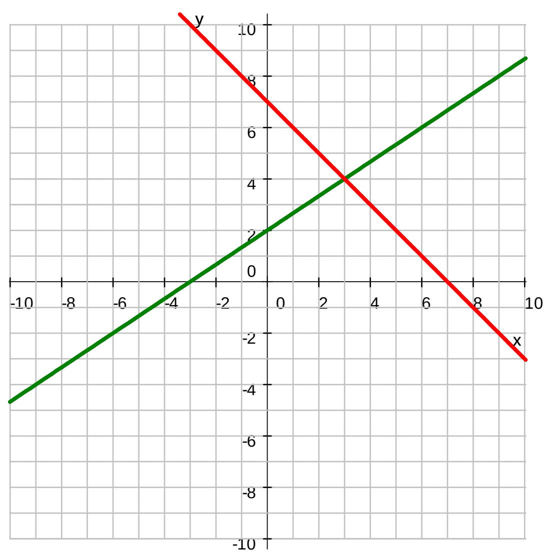
$$\begin{aligned} \text{If } x &= 2,\ y=? && \text{substitute } x=2 \text{ into the equation of the line} \\ y &= -(2)+7=5 && \Longrightarrow \text{ we found } (2,5) \end{aligned}$$

$$\begin{aligned} \text{If } x &= 4,\ y=? && \text{substitute } x=4 \text{ into the equation of the line} \\ y &= -(4)+7=3 && \Longrightarrow \text{ we found } (4,3) \end{aligned}$$

$$\begin{aligned} \text{If } x &= 6,\ y=? && \text{substitute } x=6 \text{ into the equation of the line} \\ y &= -(6)+7=1 && \Longrightarrow \text{ we found } (6,1) \end{aligned}$$

$$\begin{aligned} \text{If } x &= 7,\ y=? && \text{substitute } x=7 \text{ into the equation of the line} \\ y &= -(7)+7=0 && \Longrightarrow \text{ we found } (7,0) \end{aligned}$$

We graph the points $(0,7)$, $(2,5)$, $(4,3)$, $(6,1)$, and $(7,0)$ and connect the points. (Red line.)



We read from the graph that the lines intersect at $(3,4)$. ♠

(b) Use algebraic methods to check your answer for part a).

Solution: Is the point $(3,4)$ on the line $2x-3y=-6$?

$$\text{LHS} = 2x-3y = 2(3)-3(4) = 6-12 = -6 = \text{RHS} \quad \Longrightarrow \quad \text{yes}$$

Is the point $(3,4)$ on the line $y=-x+7$?

$$\begin{aligned} \text{LHS} &= y=4 \\ \text{RHS} - x + 7 &= -3+7=4=\text{LHS} \quad \Longrightarrow \quad \text{yes} \end{aligned}$$ ♠