SOLVING LINEAR SYSTEMS:

Using Substitution

5d pg. 26

① $2x+y=10$

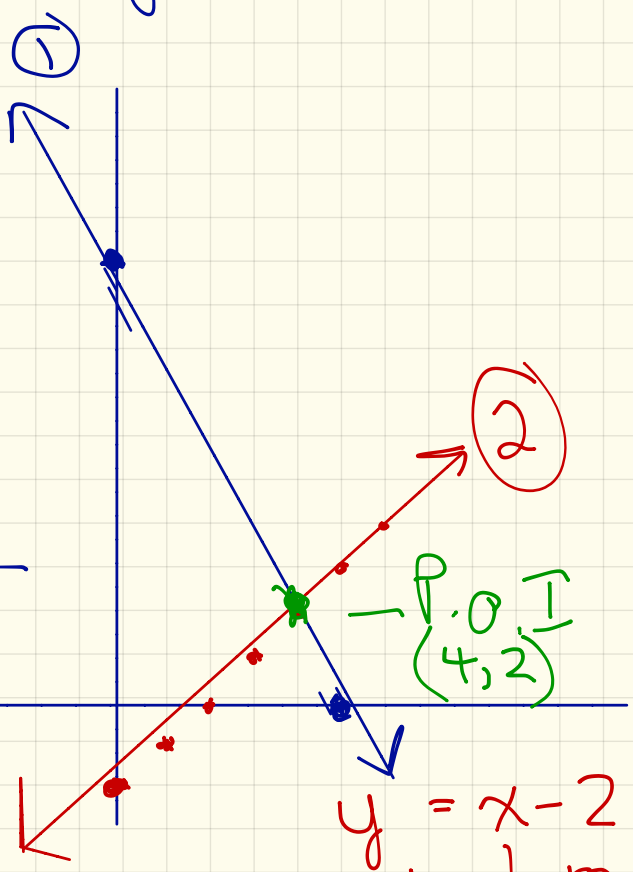
② $y=x-2$

$m=1$

y Int. $=-2$

$x=5$, x Int.

y Int., $y=10$



Check (4,2)

$2x+y=10$

LS	RS
$2x+y$	10 ✓
$2(4)+2$	
10 ✓	

$y=x-2$

LS	RS
y	$x-2$
✓ 2	$4-2$
2	

Pg 21 #8.

Let N represent time to North Bay

Let T represent the time from North Bay to Tamagami.

① $N + T = 6$

N Int. = 6

T INT = 6

$\text{Speed} = \frac{\text{dist.}}{\text{time}}$

$\text{dist.} = \text{speed} \times \text{time}$

② $70N + 50T = 393$

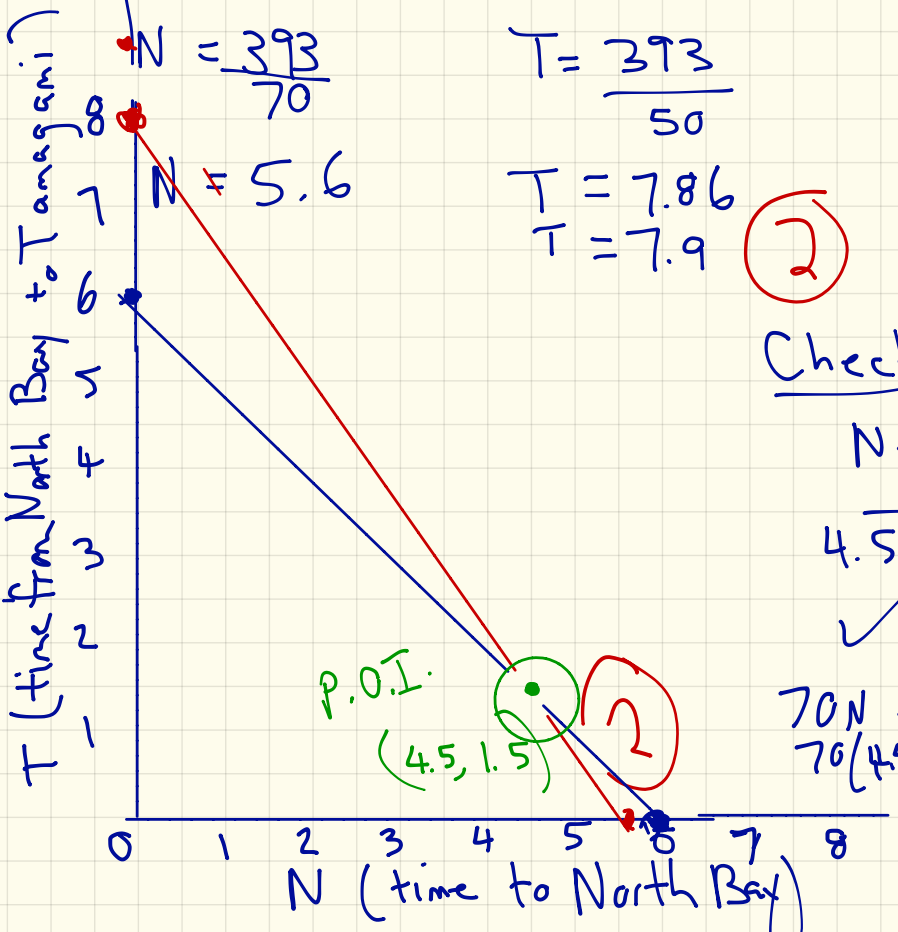
$70N + 50T = 393$

$70N = 393$ $\quad 50T = 393$

$N = \frac{393}{70}$ $\quad T = \frac{393}{50}$

$N = 5.6$ $\quad T = 7.86$

$T = 7.9$ (2)



Check

$N + T = 6$

$4.5 + 1.5 \mid 6$

$\checkmark 6$

$70N + 50T = 393$

$70(4.5) + 50(1.5)$

$315 + 75$

390

$\therefore$ 4.5 hours to North Bay

1.5 hours to Tamagami

Pg 27 #12.

Let c represent cost/metre of cotton fabric

Let d represent $\frac{\text{cost}}{\text{metre}}$ of denim fabric

① Willow $3d + 5c = 22$

② Jared $6d + 2c = 28$

① $3d = 22$ $\quad 5c = 22$

$d = \frac{22}{3}$ $\quad c = \frac{22}{5}$

$d = 7.33$ $\quad c = 4.4$

② $6d + 2c = 28$

$6d = 28$

$d = \frac{28}{6}$

$d = 4.67$

$2c = 28$

$c = \frac{28}{2}$

$c = 14$

$6d + 2c = 28$

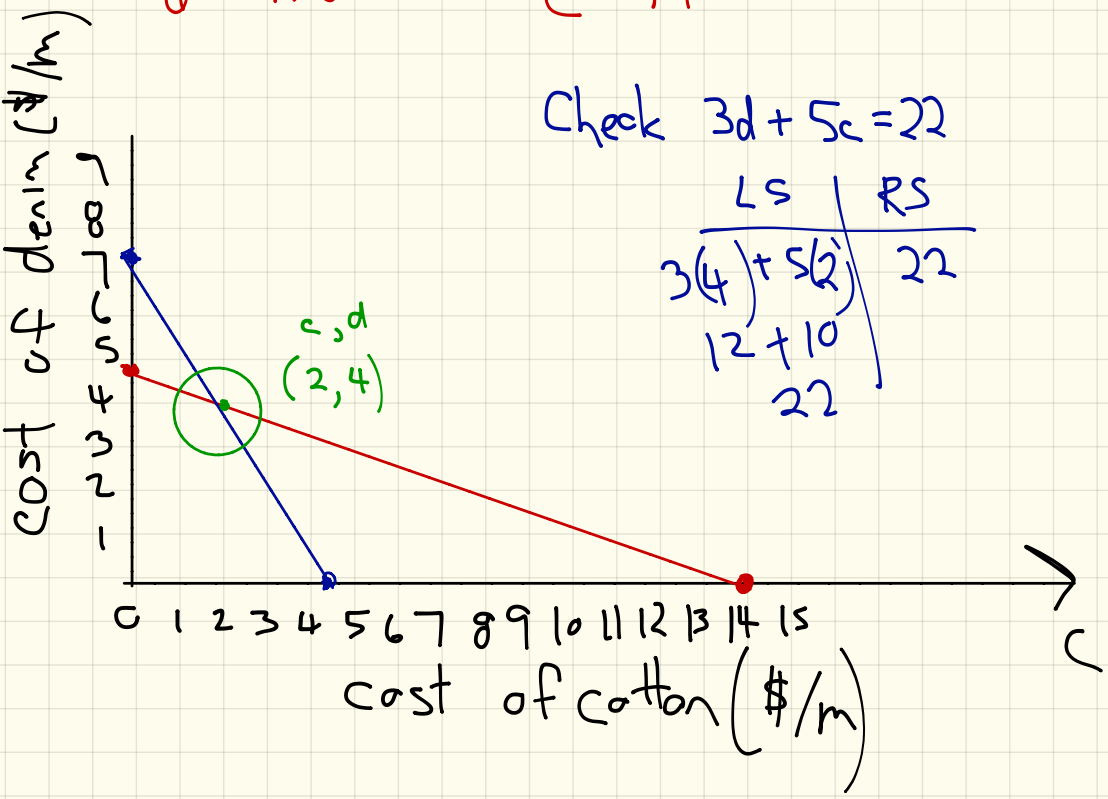
$6(4) + 2(2)$

$24 + 4$

28 ✓

Check $3d + 5c = 22$

LS	RS
$3(4) + 5(2)$	22
$12 + 10$	
22	



BIG IDEAS

- Substitution Strategy
  - A method in which a variable in one expression is replaced with an equivalent expression from another expression, when the value of the variable is the same in both.

BIG IDEAS (CONT.)

HOW TO SOLVE USING SUBSTITUTION:

1. Number the equations. ① and ②
2. Choose a variable to solve for.
3. Solve for this variable, creating a new equation. ③
4. Substitute ③ into the original equation that was not modified.
5. Expand, simplify, and solve for the variable.
6. Substitute the value into ③ to solve for the remaining variable.
7. State the point of intersection.
8. Verify, if necessary.

EXAMPLE #1

Solve the linear system and verify your solution.

$2x + y = 5$ ① $\Rightarrow$ $y = 5 - 2x$ ③

$x - 3y = 13$ ②

Substitute ③ into ②.

$$x - 3(5 - 2x) = 13$$
$$x - 15 + 6x = 13$$
$$7x - 15 = 13$$
$$7x = 28$$
$$x = 4$$

Substitute $x=4$ into ③.

$$y = 5 - 2(4)$$
$$y = 5 - 8$$
$$y = -3$$

$\therefore$ the point of intersection is $(4,-3)$.

Equation 1: $2x + y = 5$	
LS	RS
$=2x+y$ $=2(4)+(-3)$ $=8-3$ $=5$	$=5$

Equation 2: $x - 3y = 13$	
LS	RS
$=x-3y$ $=(4)-3(-3)$ $=4+9$ $=13$	$=13$

EXAMPLE #1 (CONT)

- What if you had chosen the other variable? Would you get the same answer? Let's see...

$2x + y = 5$ ①

$x - 3y = 13$ ② $\Rightarrow x = 13 + 3y$ ③

Substitute ③ into ①.

$2(13 + 3y) + y = 5$

$26 + 6y + y = 5$

$26 + 7y = 5$

$7y = -21$

$y = -3$

Substitute $y=-3$ into ③.

$x = 13 + 3(-3)$

$x = 13 - 9$

$x = 4$

$\therefore$ the point of intersection is $(4,-3)$.

EXAMPLE #2

Did you get (3,-4)?

Solve the linear system.

① $3x + y = 5$ → Isolate y

② $x - 2y = 11$

$3x - 3x + y = 5 - 3x$

③ $y = 5 - 3x$

Substitute ③ into ②

$x - 2(y) = 11$

$x - 2(5 - 3x) = 11$

Simplify and solve for x

$$x - 2(5 - 3x) = 11$$

$$x - 10 + 6x = 11$$

$$7x = 11 + 10$$

$$7x = 21$$

$$\frac{7x}{7} = \frac{21}{7}$$

$$\boxed{x = 3}$$ → substitute into (3)

(3) $y = 5 - 3x$

$y = 5 - 3(3)$

$y = 5 - 9$

$\boxed{y = -4}$

P.O.I. $(3, -4)$

P.O.I. $(3, -4)$

① $3x + y = 5$

LS	RS
$3(3) - 4$	5
$9 - 4$	✓
5	

② $x - 2y = 11$

LS	RS
$3 - 2(-4)$	11
$3 + 8$	✓
11	

HW

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- copy note
- Try pg. 39 #9 a

Extra help Tues & Thurs lunch.

EXAMPLE #3

Did you get (-2,3)?

Solve the linear system.

$$5x - 2y = -16$$

$$-2x + y = 7$$

EXAMPLE #4

Did you get (2,5)?

Solve the linear system.

$y = -2x + 9$

$y = 3x - 1$

CONSOLIDATION

Directions Match the system of equations with the modified equation that can be used to solve the system of equations by substitution. Draw a line between the system and the equation used to substitute.

$2x + y = 11$ $x - y = 2$	$x = -2y + 6$
$4x - y = 7$ $5x - 8y = 2$	$x = -6y + 5$
$2x + 2y = 4$ $3x - 3y = 18$	$y = -2x + 1$
$2x + y = 1$ $10x - 4y = 2$	$y = 4x - 7$
$-3x - y = -13$ $X + 2y = 6$	$x = y + 2$
$2x - 6y = 4$ $X + 6y = 5$	$x = -y + 2$

REINFORCEMENT

- Pages 39 - 40
  - #3, 5, 16