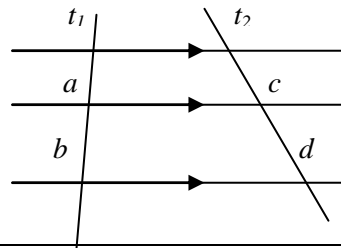


Set A is said to be a subset of set B if and only if every element in A is in B . We write $A \subseteq B$. For example, $\{a, c\} \subseteq \{a, b, c, d\}$ while $\{a, c\} \not\subseteq \{b, c, d\}$ because $a \notin \{b, c, d\}$. Note that we define the empty set to be a subset of every set.

- 1)
 - a) List all the subsets of $\{a, b, c\}$.
 - b) Explain how you can use the Multiplication Principle of Counting introduced in Problem Set #2 to predict that the number of subsets of $\{a, b, c\}$ would be 8.
 - c) How many subsets does a set with 10 elements have?

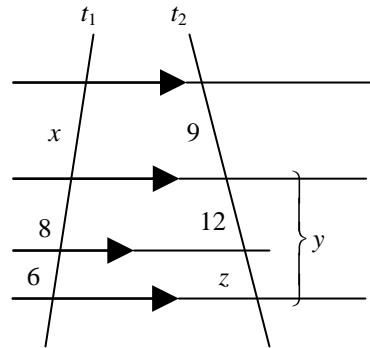
If parallel lines are cut by transversals, then the segments are proportional:

$$\frac{a}{b} = \frac{c}{d}$$



2)

Solve for (x, y, z) .



- 3) Graph the region described by: $\{(x, y) \mid -7 \leq x \leq 3 \text{ and } -4 \leq y \leq 2\}$

State the coordinates of the vertices of the figure.

- 4) **NC** Solve for (x, y) : $3 \ 2 \ 4^T + 5 \begin{bmatrix} -4 \\ 6 \end{bmatrix} = \begin{bmatrix} x - y \\ x + y \end{bmatrix}$

- 5) If 4 cows can eat 5 bales of hay in 3 days, how long will it take 6 cows to eat 15 bales of hay? (Assume all cows eat hay at the same constant rate.)

6)

	BINDER	NOTEBOOK	PEN
Tu	2	4	3
Jones	4	3	5
Condie	6	5	4

Binders cost \$2.75 each

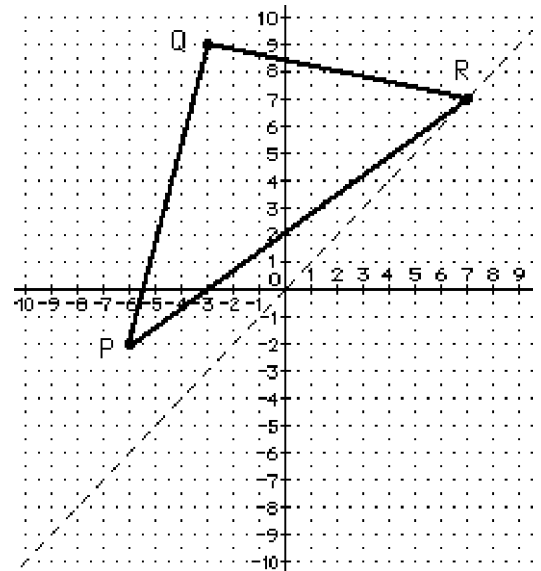
Notebooks cost \$1.35 each

Pens cost \$1.45 each

Using matrix operations, write a matrix equation to find the total amount each person spent on supplies.

7)

- Sketch the reflection of $\triangle PQR$ over the 45° line, $y = x$.
Label it : $\triangle P'Q'R'$
- What are the coordinates of the points P' , Q' , R' ?
- Describe what happens to the coordinates of P , Q , and R under this reflection.
- What matrix multiplication will reflect $\triangle PQR$ onto $\triangle P'Q'R'$?
Write a matrix equation to describe the transformation.



- A point (x,y) on a graph is determined by these two equations: $x = 6 + t$, $y = 8 - 3t$.

Suppose $t \in [0, 5]$.

- Make a table of values for t , x , and y for just integer values of t .
- What is the range of x ?
- What is the range of y ?
- Graph the ordered pairs (x,y) on coordinate axes.
- What is the total distance traveled by the point as t went from 0 to 4? State exactly.

The 5-Number Summary

The median of a set of data divides the data into two sets. The *lower quartile* (Q_1) is the median of the set of numbers *below* the median. The *upper quartile* (Q_3) is the median of the set of numbers *above* the median. If the original data set has an odd number of points the single number which represents the median is not counted in either set when computing the quartiles. In general the *middle 50%* of the data will lie on or between Q_1 and Q_3 . The value $Q_3 - Q_1$ is called the *interquartile range* of the data.

The *5-number summary* of a set of data includes the *minimum*, Q_1 , the *median*, Q_3 , and the *maximum*.

- 9) a) Give the 5-number summary for actual energy consumption amounts (in kilowatt-hours) for one residence. Each number given represents a 2-month billing period.

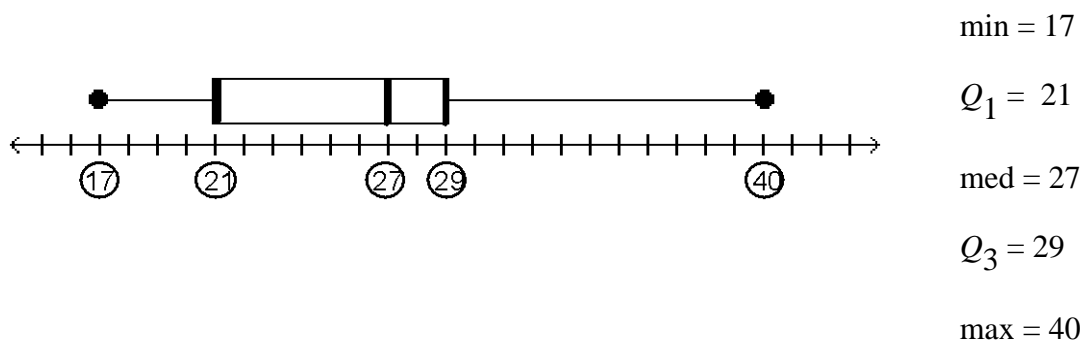
728 774 859 882 791 731 838 862 880 831
 759 774 832 816 860 856 787 715 752 778
 829 792 908 716 839 752 834 818 836 751
 825

- b) Give the interquartile range for these data.

A **box plot** (sometimes called a box-and-whiskers plot) is a

graphical display of data based on the 5-number summary.

For example the following box plot represents the data at the right.

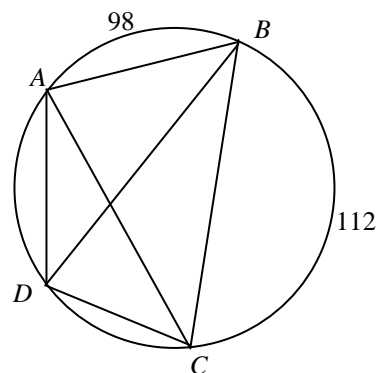


- c) Draw a box plot for the data in part (a) above. Label the 5 key numbers on the number line.

Interior Angles

An interior angle for a circle is an angle determined by two chords with a common endpoint. The measure of an interior angle is one-half the measure of its intersecting arc.

For example, $m\angle DAC = \frac{1}{2}m \text{ } \overset{\frown}{CD}$



- 10) Find the measures of

a) $\angle ADC$

c) $\angle CAB$

b) $\angle BCA$

d) $\angle ABC$

One way to solve a *quadratic equation* (or higher degree) is to set it equal to zero and use the *zero product property*. That is, if $a \cdot b = 0$ then either $a = 0$ or $b = 0$.

Example:

$$\text{Solve } x^2 + x = 10 - 2x$$

Organize the equation so that one side is zero.

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

Factor the quadratic expression

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

Then by the zero product property

$$x + 5 = 0 \quad \text{or} \quad x - 2 = 0$$

$$x = -5 \quad \quad \quad x = 2$$

11) NC Solve each of the following using this method:

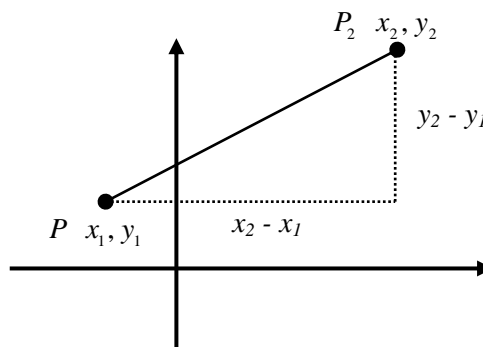
a) $x = \sqrt{6x - 8}$

b) $x^2 - 4x = 3x + 18$

c) $\frac{2}{x+2} = \frac{x+3}{x+8}$

The distance between two points $P_1 \ x_1, y_1$ and $P_2 \ x_2, y_2$ is given by the formula:

$$d = \sqrt{x_2 - x_1^2 + y_2 - y_1^2}$$



12) Consider the system of equations:

$$\begin{cases} 2x + y = 12 \\ x - 18y = 80 \\ 3x + 8y = 31 \\ 10x - 7y = -65 \end{cases}$$

The graphs of these equations form a quadrilateral.

- a) State the vertices of the quadrilateral. This would be a good problem to use the techniques you learned in unit 1 for solving simultaneous equations.
- b) Determine the area of the quadrilateral using the shoelace method. Show your work.
- c) Find the perimeter of the quadrilateral. State answer to two decimal places.