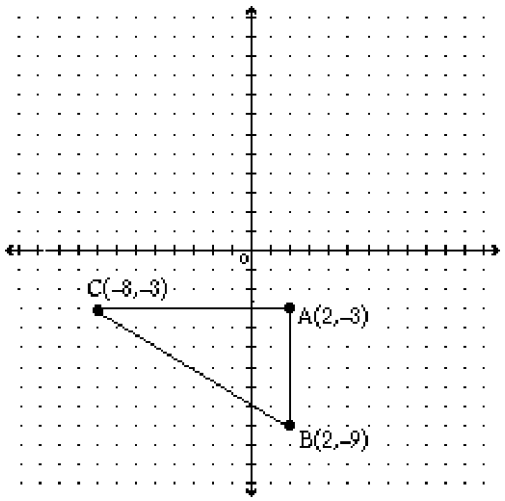
1) Dr. Condie has 2 sport coats, 5 pairs of slacks, 4 shirts and 6 ties that he can choose to wear on any day.

   a) How many combinations of these four pieces of clothing can he wear if he must wear one of each item?
   b) Does the answer to part (a) change if he need not wear a sport coat. Explain why or why not.

2) A resort has 6 empty rooms and 4 travelers who want rooms. In how many ways can the manager assign a room to each traveler, given that no travelers share a room?

3) **NC** Simplify into a single fraction: $\sqrt{75} - \frac{1}{5}\sqrt{\frac{4}{3}} - \frac{1}{2} \cdot \frac{\sqrt{3}}{3}$

4)



Write a matrix equation and give result:

(a) that will reflect ΔABC over the y-axis.

(b) that will reflect ΔABC over $y = -x$.

(c) that will rotate ΔABC 180° about the origin.

(d) that will shrink the triangle to fourth its area.

5) **NC** Use the **zero product property** to solve each: (be sure to check your answers)

(a) $6x^2 = 7x + 24$

(b) $\sqrt{9x+13} = x + 3$

(c) $\begin{vmatrix} 2x & 3 \\ 5 & x \end{vmatrix} = -7x$

(d) $x^4 - 13x^2 + 36 = 0$

Solving Quadratics by Completing the Square

While the zero product property works well as a method for solving many quadratic equations, other methods are also possible.

If a perfect square trinomial is equal to a number, taking the square root of both sides of the equation is a good way to proceed.

For example: If $(x + 4)^2 = 25$

then $x + 4 = \pm\sqrt{25}$

$x = 4 \pm 5$

$x = 9$ or -1

If $9x^2 - 6x + 1 = 7$

then $(3x - 1)^2 = 7$

$3x - 1 = \pm\sqrt{7}$

$3x = 1 \pm \sqrt{7}$

$x = \frac{1 \pm \sqrt{7}}{3}$ or $\frac{1}{3} \pm \frac{\sqrt{7}}{3}$

6) NC Solve for x. Give exact answers.

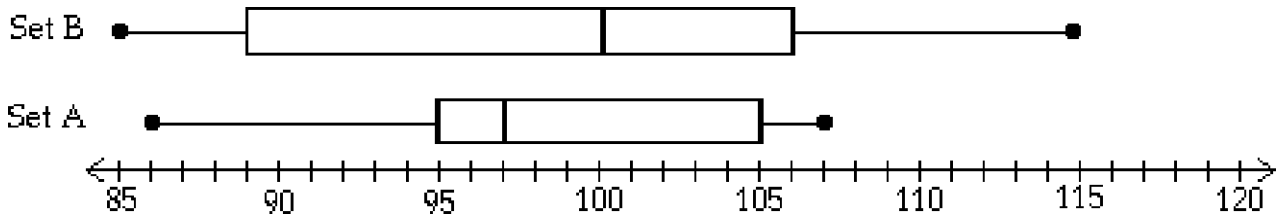
a) $(2x+3)^2 = 18$ b) $(x-3)^2 = 15$

c) $25x^2 + 20x + 4 = 225$

7) **NC** Solve for (x,y): $\begin{cases} \frac{1}{x} + \frac{1}{y} = 2 \\ \frac{1}{x} - \frac{1}{y} = 8 \end{cases}$

8) a) Which set below has the larger median?

b) How much larger is it?



The *range* of a set of data is the maximum value minus the minimum value.

The range and interquartile range are *measures of dispersion* or *spread*.

The *midrange* is another measure of central tendency used in statistics.

It is the mean of the minimum and the maximum.

9) a) Give the range for Set A in Problem 8.

b) Give the interquartile range for Set A in Problem 8.

In a fraction containing radicals, either the numerator or the denominator can be rationalized, that is, multiplied by some expression so that the product is a rational number.

For example, to rationalize the denominator in:

Ex: $\dfrac{1+\sqrt{7}}{\sqrt{5}} = \dfrac{1+\sqrt{7}\ \ \sqrt{5}}{\sqrt{5}\ \ \sqrt{5}} = \dfrac{\sqrt{5}+\sqrt{35}}{5}$

Ex: $\dfrac{\sqrt{5}}{1+\sqrt{7}} = \dfrac{\sqrt{5}\ \ 1-\sqrt{7}}{1+\sqrt{7}\ \ 1-\sqrt{7}} = \dfrac{\sqrt{5}-\sqrt{35}}{1-7} = \dfrac{\sqrt{35}-\sqrt{5}}{6}$

10) Simplify $\dfrac{\sqrt{5}}{\sqrt{17}}$

a) by rationalizing the numerator.

b) by rationalizing the denominator.

11) Rationalize the denominator and simplify:

a) $\dfrac{3+\sqrt{5}}{3-\sqrt{5}}$ b) $\dfrac{x+\sqrt{x}}{x-\sqrt{x}}$

12) State all values of x for which the expression in 11b is defined. State answer in interval notation.

13) $\sqrt{x^2} = x$ is not always true.

a) Find two real values of x for which it is false.
b) Find two real values of x for which it is true.
c) Based upon your answers in (a) and (b), state the condition for the statement to be true.

14) The table below gives the life expectancy at birth (in years) of males born in the United States.

Birth year	Life expectancy	Birth year	Life expectancy
1900	48.3	1960	66.6
1910	51.1	1970	67.1
1920	55.2	1980	70.0
1930	57.4	1990	71.8
1940	62.5	2000	73.0
1950	65.6	2010	75.5

Give all answers to two decimal places.

a) Find a linear model that describes this data giving life expectancy L as a function of time t. For 1900 let $t = 0$, 1910 let $t = 10$ and so on.

b) According to your model, what was the life expectancy for a male born 1996?

c) According to your model, what was the life expectancy in 1776? Comment on the appropriateness of your model in doing this extrapolation.

15) (Continuation of problem set 2) Consider the graph of $y = x^2$ and transformations of the graph given by $y = (x-h)^2 + k$.

a) Examine the graph of $y = x^2$ and $y = x^2 + k$ for different values of *k*. What effect do different values of *k* have upon the graph of $y = x^2$? Give an example (both equation and sketch) in your explanation.

b) Examine the graph of $y = x^2$ and $y = (x-h)^2$ for different values of *h*. What effect do different values of *h* have upon the graph of $y = x^2$? Give an example (both equation and sketch) in your explanation.

c) Generalize your results by what effect both *h* and *k* have of the graph of $y = x^2$ when $y = (x-h)^2 + k$. Give an example (both equation and sketch) in your explanation.

Save these results along with your results in problem set # 2 for a future problem set.