1. (10pts) Solve the following inequalities and:
a) shade the solution on the number line
b) write the solution in interval notation

$2 \leq 3 - 2x < 7$

$|x + 5| \geq 4$

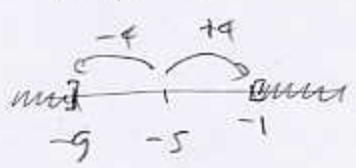$2 \leq 3 - 2x$ and $3 - 2x < 7$

$-1 \leq -2x$ $-2x < 4 \ (\div -2)$

$\frac{1}{2} \geq x$ and $x > -2$

$|x - (-5)| \geq 4$

distance from ≥ 4
x to -5

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

$x \in (-2, \frac{1}{2}]$

$x \leq -9$ or $x \geq -1$
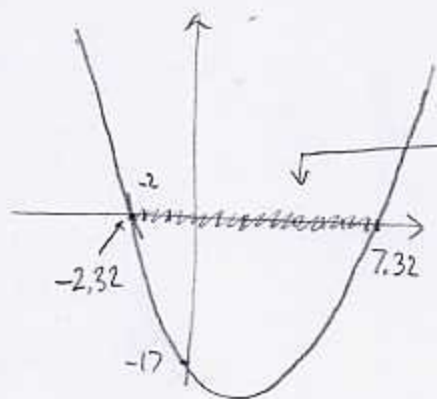
$x \in (-\infty, -9] \ or \ [-1, \infty)$

2. (5pts) Use your calculator to solve the inequality $x^2 - 5x \leq 17$. Sketch the appropriate graph here, shade your solution on the number line and write it in interval notation.

$x^2 - 5x - 17 \leq 0$
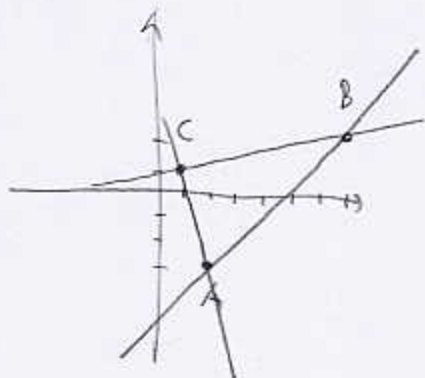
Sketch $y = x^2 - 5x - 17$

$-2.32 \leq x \leq 7.32$

or $x \in [-2.32, 7.32]$

need x's
for which
graph is
below
x-axis

$[-10, 10] \times [-50, 30]$

3. (5pts) Let $A = (2, -3)$, $B = (7, 2)$, $C = (1, 1)$. Without using the Pythagorean theorem, determine whether the triangle ABC is a right triangle. (Hint: check for perpendicular lines.)

Find slopes of lines AB, BC, AC

$$m_{AB} = \frac{2-(-3)}{7-2} = \frac{5}{5} = 1$$

$$m_{BC} = \frac{2-1}{7-1} = \frac{1}{6}$$

$$m_{AC} = \frac{-3-1}{2-1} = \frac{-4}{1}$$

no two are negative reciprocals of each other

4. (5pts) The line $3x + 2y = 5$ is given.
a) Find the equation of the line that passes through $(3, 2)$ and is parallel to the given line.
b) Sketch the picture.

a) $3x + 2y = 5$

$$2y = -3x + 5 \quad |\div 2$$
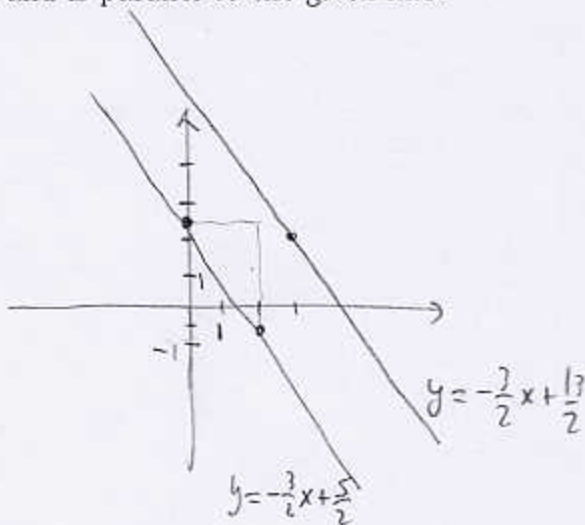
$$y = -\frac{3}{2}x + \frac{5}{2}$$
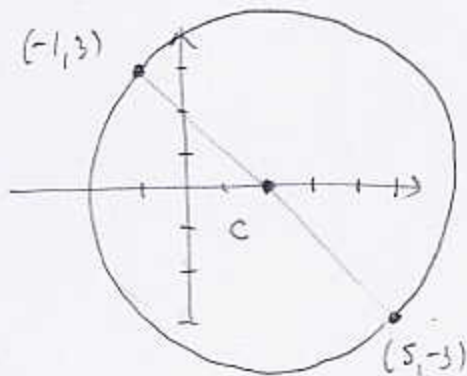
$$m = -\frac{3}{2}$$

new line:

$$m = -\frac{3}{2}$$

$$y - 2 = -\frac{3}{2}(x-3)$$

$$y = -\frac{3}{2}x + \frac{9}{2} + 2$$

$$y = -\frac{3}{2}x + \frac{13}{2}$$

$$y = -\frac{3}{2}x + \frac{13}{2}$$

$$y = -\frac{3}{2}x + \frac{5}{2}$$

5. (5pts) Find the equation of the circle whose diameter is the line segment connecting $(-1, 3)$ and $(5, -3)$. Draw the picture.

$(-1, 3)$

c

$(5, -3)$

$$C = \text{midpt. of } (-1, 3) \text{ and } (5, -3) = \left(\frac{-1+5}{2}, \frac{3-3}{2}\right)$$

$$= (2, 0)$$

$$r = \text{distance from } (2,0) \text{ to } (5, -3)$$

$$= \sqrt{(5-2)^2 + (-3-0)^2} = \sqrt{9+9} = \sqrt{18} = 3\sqrt{2}$$

Equation: $(x-2)^2 + (y-0)^2 = (\sqrt{18})^2$

$$(x-2)^2 + y^2 = 18$$