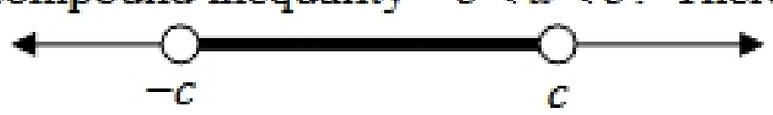
Summer MA 15200 Lesson 14 Section 1.7 (part 2) and Sections 1.1 & 2.8

I Solving Absolute Value Inequalities

Absolute Value Inequalities: $|u| < c$ or $|u| \le c$, if $c \ge 0$

The inequality $|u| < c$ indicates all values less than c units from the origin. Therefore $|u| < c$ is equivalent to the compound inequality $-c < u < c$. There is a similar statement for $|u| \le c$.

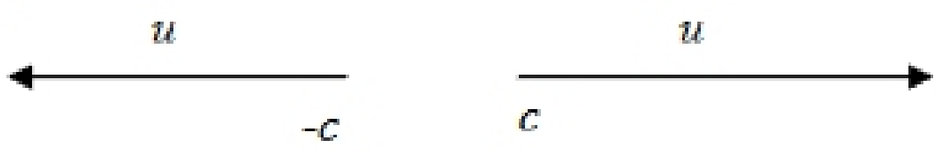


Absolute Value Inequalities: $|u| > c$, $|u| \ge c$, if $c > 0$

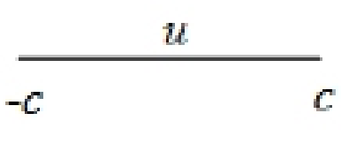
The inequality $|u| > c$ indicates all values more than c units from the origin. Therefore $|u| > c$ is equivalent to the inequality statement $u < -c$ or $u > c$. There is a similar statement for $|u| \ge c$.

To help you keep the two cases straight in your head, I recommend thinking of a number line.

If the absolute value is greater than a positive number c, it is greater than that many units away from zero.



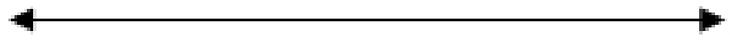
If the absolute value is less than a positive number c, it is within that many units of zero.



Ex 1: Solve each. Write solutions using interval notation and graph the solutions on a number line.

Hint: Always isolate the absolute value before writing an inequality without the absolute value.

a) $|x+4| < 6$



b) $|3x+5|+1 \le 9$

c) $\left|\frac{5x+2}{3}\right| < 1$

Ex 2: Solve each inequality. Write the solutions using interval notation and graph the solutions on a number line.

a) $|2-x| > 5$

b) $\left|\frac{x}{2}+3\right| \ge 7$

c) $|3x-4|+2 > 7$

II Applied Problems

Ex 3: Mary wants to spend **less than** \$600 for a DVD recorder and some DVDs. If the recorder of her choice costs \$425 and DVDs cost \$7.50 each, how many DVDs could Mary buy?

Ex 4: The percentage, P, of US voters who used punch cards or lever machines in national elections can be modeled by the formula $P = -2.5x + 63.1$ where x is the number of years after 1994. In which years will fewer than 35.7% of US voters use punch cards of lever machines?

Ex 5: A college provides its employees with a choice of two medical plans shown in the following table.

Plan 1:	\$100 deductible payment	30% of the remaining payments
Plan 2:	\$200 deductible payment	20% of the remaining payments

For what size hospital bills is plan 2 better for the employee than plan 1? (Assume the bill is over \$200.)