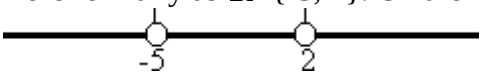
Simplifying Interval Notation

Throughout the course you will be asked to put your answers in interval notation. The book teaches you how to write answers in interval notation, but I have found that many students often leave their answer in a form that could be simplified.

Example 1: Suppose your answer to a problem is all reals except -5 and 2. This could be written more formally as $\mathbb{R}$ -{-5, 2}. On the number line you could graph this solution as

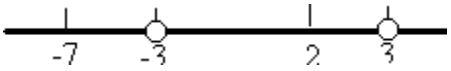


. As you can see this breaks up the number line into 3 intervals, so your answer in interval notation is: $(-\infty, -5) \cup (-5, 2) \cup (2, \infty)$

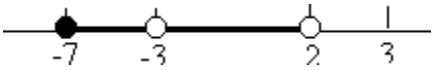
Sometimes you will be putting two ideas together to solve a problem.

Example 2: $-7 \le x < 2$ and $x \ne \pm 3$.
Graphically you get:

intersected with:



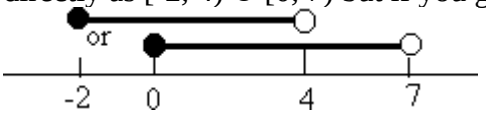
which results in:



Note: "and" means intersect, which can be thought of as where the intervals overlap.

In interval notation this translates to: $[-7, -3) \cup (-3, 2)$.

Example 3: Write $-2 \le x < 4$ or $0 \le x < 7$ in interval notation.
Note: "or" means union, which includes all the points that are in one interval or the other.
Some students would translate this directly as $[-2, 4) \cup [0, 7)$ but if you graph this you will see that there is an overlap in your answer:



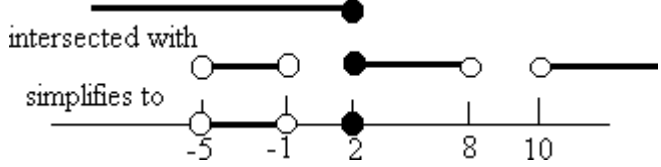
which is equivalent to:

. Thus in interval notation this simplifies to: $[-2, 7)$.

Later in the course you will run into some problems where there is an individual point in your answer.

Example 4: $x = 5$ or $0 \le x < 3$. In interval notation this is written as: $[0, 3) \cup \{5\}$

Example 5: Simplify $(-\infty, 2] \cap \{(-5, -1) \cup [2, 8) \cup (10, \cup)\}$



So the answer is: $(-5, -1) \cup \{2\}$