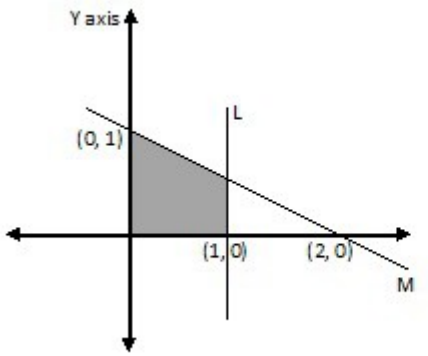
A topic that has been steadily gaining ground in GMAT is co-ordinate geometry. First of all, I have to admit that I am not a fan of Geometry. Just something about learning the theorems and applying those to get the unknown angle/side makes me uncomfortable. It is easy to miss the big picture in some questions. That said, I adore co-ordinate geometry. I know that the moment I draw the diagram, the answer would be right there in front of my eyes. So let's start a discussion on co-ordinate geometry this week.

Usually, GMAT deals with two dimensional figures in the XY plane. Many questions are based on points and intersecting lines. The general form of the equation of a line is ax + by = c. If you are not sure of how to draw a line given its equation, check out this post. Using an example, let's see how this can be helpful.

Question: In the rectangular coordinate given in the image, the shaded region is bounded by straight lines. Which of the following is NOT an equation of one of the boundary lines?



(A) x = 0
(B) y = 0
(C) x = 1
(D) x – y = 0
(E) x + 2y = 2

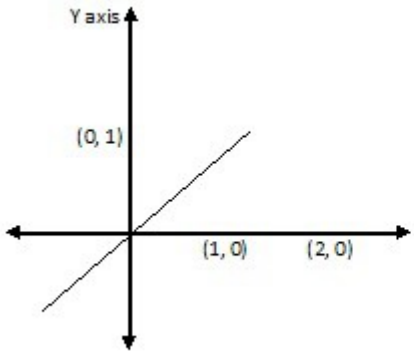
Solution:

The equation of the Y axis is x = 0 so option (A) is not the answer.

The equation of the X axis is y = 0 so option (B) is not the answer.

The equation of the line L is x = 1 so option (C) is not the answer.

This is how you represent x – y = 0 (which can also be written as y = x)



You can see that it is not one of the boundary lines. Hence, answer is (D). This is how knowing how to draw the line given the equation is useful.

You can also find questions related to the relation between two lines i.e. whether the lines are parallel or intersecting or perpendicular. Let's find out what these relations are.

Say, the equation of 2 lines is:

ax + by + c = 0; Slope = -a/b; y intercept = -c/b

and

mx + ny + p = 0; Slope = -m/n; y intercept = -p/n

If two lines intersect in a single point, their slopes will be different i.e. –a/b ≠ -m/n

We can re-write this as a/m ≠ b/n

If two lines are parallel, their slopes will be the same i.e. –a/b = -m/n

We can re-write this as a/m = b/n

What happens if the given two equations are of the same line? Then their slopes and their y intercepts will be the same i.e. –a/b = -m/n and –c/b = -p/n

We can re-write this as a/m = b/n and c/p = b/n giving us a/m = b/n = c/p

Hence, if you want to find two parallel lines that are distinct, ensure that their y intercept is not the same i.e. –c/b ≠ -p/n

The relation becomes a/m = b/n ≠ c/p

If two lines are perpendicular, the product of their slopes will be -1 i.e. –a/b * -m/n = -1

We can re-write this as am = -bn

Let me recap the relations for you:

1. A single point of intersection between two lines: a/m ≠ b/n
2. Distinct parallel lines: a/m = b/n ≠ c/p

3.The same line: a/m = b/n = c/p

4.Perpendicular lines: am = -bn

Take your time to be comfortable with these relations. Next week, we will take up some questions related to this concept.