# 1324-BZBS14e-Notes-5-1-linear-inequalities

Thursday, July 18, 2019 1:22 AM

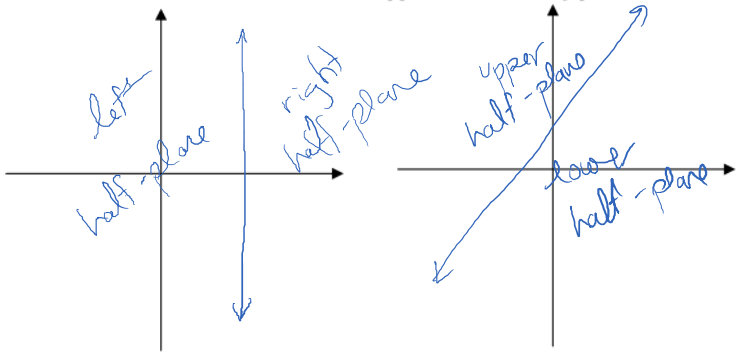
1324-BZBS14e-Notes-...



## 5.1: Linear Inequalities in Two Variables

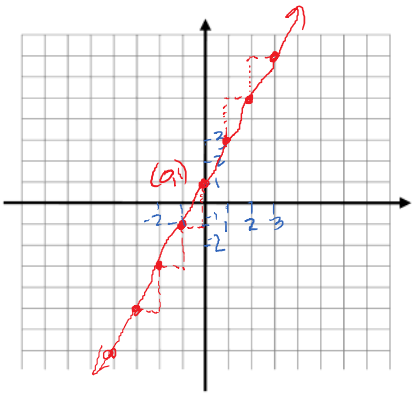
**Half-planes:**

A line divides the plane into two *half-planes*. A vertical line divides it into *left* and *right half-planes*; a non-vertical line divides it into *upper* and *lower half-planes*.




**Graphing linear inequalities:**

**Example 1:** There are four linear inequalities related to the line $y = 2x + 1$.



1st graph the line: $y = 2x+1$

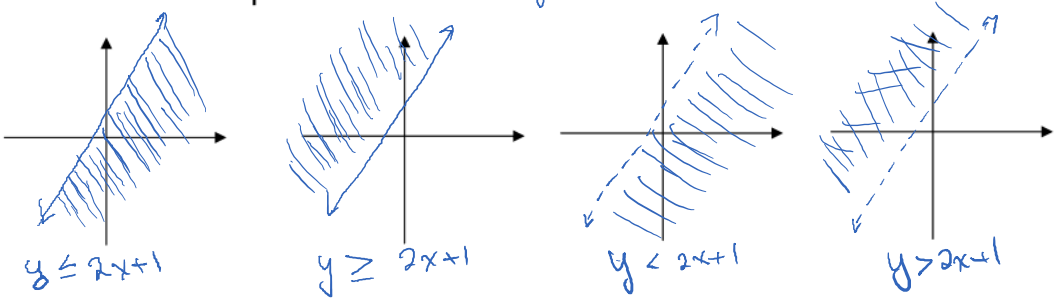
Recall: $y = mx + b$

$m$ = slope

$b$ or $(0,b)$ is the y-intercept

Here, slope $= m = \frac{\text{rise}}{\text{run}} = \frac{2}{1}$

y-intercept is 1 or $(0,1)$



**Steps for Graphing a Linear Inequality:**

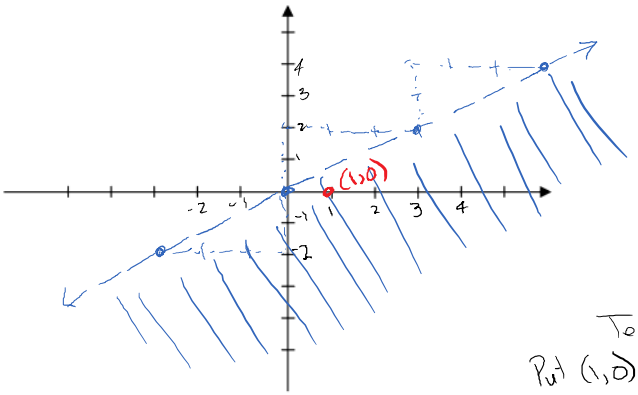
Step 1: First graph the line $Ax + By = C$ Use a solid line if equality is included ($\leq$ or $\geq$) and a dashed line if equality is not included ($<$ or $>$).

Step 2: Choose a test point not on the line and substitute the coordinates into the inequality. Determine whether this gives a true or a false statement.
*Note: The origin* $(0,0)$ *is usually a good choice, as long as it is not on the line.*

Step 3:

- If your test point makes the inequality *true*, shade the half-plane containing the test point.
- If your test point makes the inequality *false*, shade the half-plane not containing the test point.

**Example 2:** Graph the inequality $2x > 3y$.




1st graph the line: $2x = 3y$

Write as $y = mx + b$:

$3y = 2x$

$\frac{3y}{3} = \frac{2x}{3}$

$y = \frac{2}{3}x + 0$

y-int: 0 or (0,0)

slope: $m = \frac{2}{3}$

Test point not on line: (1,0)

Put (1,0) into $2x > 3y$

$x=1, y=0 \Rightarrow 2(1) > 3(0)$

$2 > 0$ True.

(1,0) needs to be shaded.

shade the half-plane that contains (1,0)