

1. Is $y = 17$ the equation of a line? If so, where did the mx term go, and what would be the graph of this equation? If not, why not – and does it have a graph (not linear) at all?

- 2a.** In the examples we did in class, each time the two lines we looked at intersected at exactly one point. Is it possible for two lines to miss each other completely? If not, explain why not. If so, give an example and describe in general what has to happen for two lines have no intersection at all.
- b.** How about the other way: is it possible for two lines to intersect in exactly two points? If not, explain why not. If so, give an example and explain what has to happen in general.
- c.** How about having more than two points of intersection? Is it possible for two lines to intersect exactly 17 times? How about have an infinite number of intersections? As usual, in each case, either explain why that cannot happen, or give an example and explain what has to happen in general.

3. Working in the Cartesian coordinate plane, find the equation of the line which passes through the points $(-1, 2)$ and $(3, 5)$.

4. Now find the distance between the points $(1, 2)$ and $(5, 5)$. Don't just quote a formula you know from (or found) elsewhere, instead explain step by step how to figure out the distance. *[Hint: the distance between two points is the same as the length of the line segment connecting them. We've discussed lengths of line segments in class, particularly when they came up in a famous Theorem – the line segments were sides of a triangle in that theorem. Draw an appropriate triangle, explain how you know it satisfies the hypotheses of the theorem you are going to use, use that theorem, and do the arithmetic to get the length.]*

4. The equation $4x + 3y = 12$ doesn't look like our usual $y = mx + b$ form for a line... but maybe its graph is a line anyway. So, first find some points on this graph by just finding pairs of numbers (x, y) which satisfy the equation. [*You might try when $x = 0$, or $y = 0$, or $x = 1$, or $y = 1$, or some such thing, then solving for what the other variable must be.*] Make a sketch of what those points look like on a some coordinate axes. If it looks like the points all fit on a line, write down the equation of that line, and try to explain how your new equation can be derived from the equation we started with; if not, explain what you think is going on.