

MATH 133 – Calculus with Fundamentals 1
Discussion Day on Lines and Linear Functions
September 5, 2017

Background

Recall that we say a function f is *linear* if $f(x) = mx + b$ for some constants m, b . The name comes from the fact that the graph $y = mx + b$ is a *straight line* in the plane. The number m is called the *slope of the line* and the constant b is called the y -intercept of the line.

Questions

- 1) (a) What is the equation of the line passing through the points $(1, 4)$ and $(2, 7)$?
(b) Sketch the line in part (a).
(c) What is the equation of the line parallel to the line from part (a) passing through the point $(-1, 4)$? (Hint: What is true about the slopes of parallel lines?)
- 2) Consider lines with equations of the form $2x + cy - 3 = 0$.
(a) For which value of c does the line contain the point $(1, 2)$?
(b) For which value of c does the line have slope -5 ?
(c) Is there any value of c such that the line is horizontal? Why or why not?
(d) For which value of c is the line perpendicular to the line given by $5x - 3y + 1 = 0$? (Hint: What is true about slopes of perpendicular lines?)
- 3) The volume V (in liters) of sample of 3 grams of carbon dioxide at 27 degrees Celsius was measured as a function of the pressure p (in atmospheres) with the results in the following table:

p	0.25	1.00	2.50	4.00	6.00
V	6.72	1.68	0.67	0.42	0.27

Is V (approximately) a linear function of p ? Why or why not? If so, find an approximate formula $V = mp + b$. If not, can you see an equation of a different form for V as a function of p ?