

MATH 135 – Calculus 1
Practice on Linear and Quadratic Functions
September 2, 2016

Background

Every line in the plane is described by an equation of the form $Ax + By + C = 0$ for some constants A, B, C . If the line is not vertical ($B \neq 0$), then it is the graph of a function. Recall that we say a function f is *linear* if $f(x) = mx + b$ for some constants m, b . The number m is called the *slope of the line* and the constant b is called the y -intercept of the line. *Quadratic functions* have the form $f(x) = Ax^2 + Bx + C$ where $A \neq 0$.

Questions

- 1) 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?)

- 2) 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 a equation of a different form for V as a function of p ?

- 3) For each of the following quadratic functions $f(x)$, complete the square, then use that form to generate a sketch of the graph $y = f(x)$ by shifting and scaling the graph $y = x^2$.
 - (a) $f(x) = x^2 + 4x + 5$
 - (b) $f(x) = 2x^2 - 8x + 2$ (Factor out a 2 first, complete the square, then multiply the 2 back in. If you know the graph $y = g(x)$, what does the graph $y = 2g(x)$ look like?)