

(Your Name)
Exercise A1
29 January 2013

Your assignment is to reproduce this document¹ word-for-word and symbol-for-symbol. You should respect the spacing and all other aspects of the layout as well. I'll be helpful and tell you that I've used a basic medium skip between paragraphs.

On Solving Quadratics

An arbitrary real quadratic polynomial has the form

$$f(x) = ax^2 + bx + c$$

for fixed coefficients $a, b, c \in \mathbb{R}$. In high school algebra one learns a handy way of solving the equation

$$ax^2 + bx + c = 0,$$

namely the quadratic formula. This says that the roots of the above equation are given by the “simple” formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

Of course, this assumes that $a \neq 0$. If it so happens that $b^2 - 4ac < 0$ then $x \notin \mathbb{R}$, rather $x \in \mathbb{C}$.

Basic Calculus

Once you've mastered algebra, you usually take a course in Calculus next. Here, the central notion is that of the **derivative**. Here's the formal definition:

Definition: Let $f(x)$ be a function defined around $x = a$. The *derivative* of $f(x)$ at $x = a$ is the limit

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}.$$

You then learn lots of shortcut formulas for taking derivatives. The common ones include

- $\frac{d}{dx} \sqrt{x} = \frac{1}{2\sqrt{x}}$
- $\frac{d}{dx} x^n = nx^{n-1}$ for any $n \in \mathbb{Q}$
- $\frac{d}{d\theta} \sin \theta = \cos \theta$.

¹Even this footnote!