2.3.1. Derivation of the quadratic formula

Every quadratic equation can be written in the form $ax^2+bx+c=0$ where $a \neq 0$. We solve this equation for x.

$$ax^2+bx+c=0 \tag{2.13}$$

$$ax^2+bx=-c \tag{2.14}$$

$$x^2+\frac{b}{a}x=\frac{-c}{a} \tag{2.15}$$

$$x^2+\frac{b}{a}x+\left(\frac{b}{2a}\right)^2=\frac{-c}{a}+\left(\frac{b}{2a}\right)^2 \tag{2.16}$$

$$\left(x+\frac{b}{2a}\right)^2=\frac{-c}{a}+\frac{b^2}{4a^2} \tag{2.17}$$

$$x=-\frac{b}{2a}\pm\sqrt{\frac{-c}{a}+\frac{b^2}{4a^2}} \tag{2.18}$$

$$x=-\frac{b}{2a}\pm\sqrt{\frac{b^2-4ac}{4a^2}} \tag{2.19}$$

$$x=-\frac{b}{2a}\pm\frac{\sqrt{b^2-4ac}}{2a} \tag{2.20}$$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a} \tag{2.21}$$