# HW0

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## Exercises

(1) **Write a Quarto document that defines variables $a = 1, b = -1, c = -2$ and print out the solutions to $f(x) = ax^2 + bx + c = 0$. Do not report complex solutions, only real numbers.**

```
a=1
b=-1
c=-2

if(b^2 == 4*a*c){
  p1 = paste0("there is one solution. The solution is ", (-b + sqrt(b^2 - 4*a*c))/(2*a), ".")
  p2 = paste0("As indicated by the red dashed line, there is one point where the quadratic curve interse
}else if(b^2 > 4*a*c){
  p1 = paste0("there are two solutions. The solutions are ", (-b + sqrt(b^2 - 4*a*c))/(2*a), " and ", (
  p2 = paste0("As indicated by the red dashed lines, there are two points where the quadratic curve inte
}else if(b^2 < 4*a*c){
  p1 = paste0("there are no real solutions.")
  p2 = paste0("As you can see, the quadratic curve does not intersect with the line y=0; hence, there ar
}
```

The quadratic formula can be applied to solve this equation:

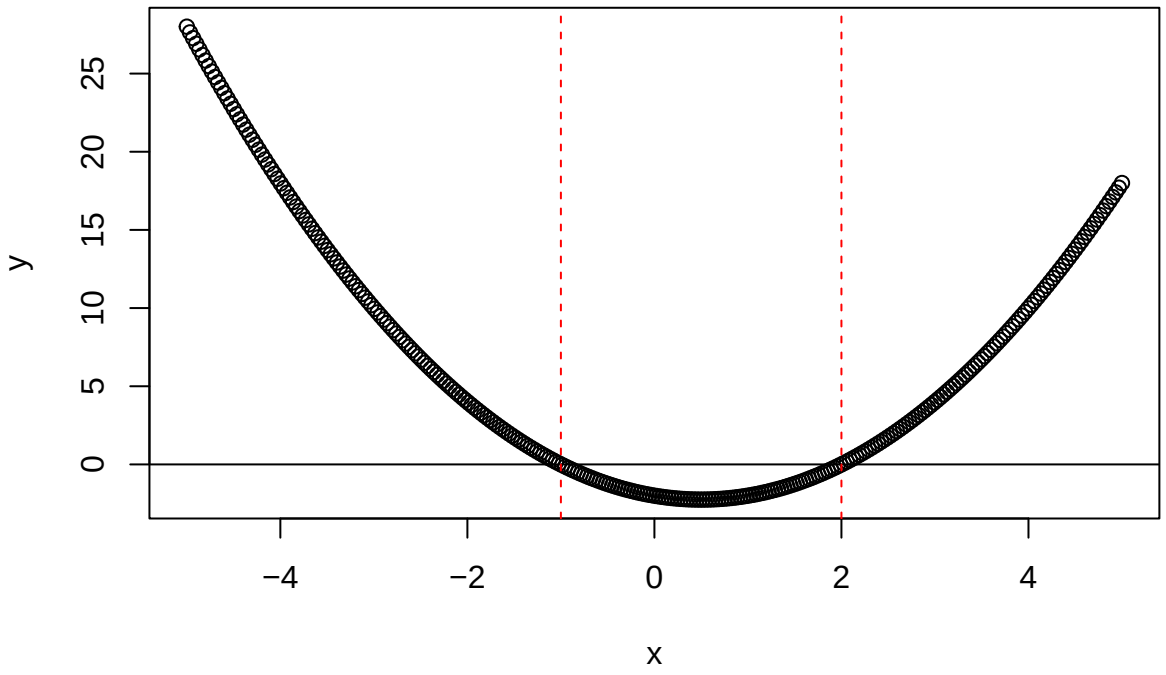
$$(-b \pm \sqrt{b^2 - 4ac})/2a$$

For the quadratic equation $1x^2 + -1x + -2 = 0$, there are two solutions. The solutions are 2 and -1.

(2) **Include a graph of $f(x)$ versus $x$ for $x \in (-5, 5)$.**

```
x=seq(-5, 5, length.out = 300)
y=a*x^2 + b*x + c
plot(x, y)
abline(h = 0)

if(b^2 == 4*a*c){
  printout = paste0("There is one solution. The solution is ", (-b + sqrt(b^2 - 4*a*c))/(2*a), ".")
  abline(v = (-b + sqrt(b^2 - 4*a*c))/(2*a), col = "red", lty=2)
}else if(b^2 > 4*a*c){
  printout = paste0("There are two solutions. The solutions are ", (-b + sqrt(b^2 - 4*a*c))/(2*a), " and
    abline(v = (-b + sqrt(b^2 - 4*a*c))/(2*a), col = "red", lty=2)
    abline(v = (-b - sqrt(b^2 - 4*a*c))/(2*a), col = "red", lty=2)
}else if(b^2 < 4*a*c){
  printout = paste0("There are no real solutions.")
}
```




Here is a graph of $f(x)$ versus $x$ for $x \in (-5, 5)$. As indicated by the red dashed lines, there are two points where the quadratic curve intersects with the line y=0, one at x=2 and the other at x=-1.

(3) **Generate a PDF report using knitr. Do not show the R code, only the solutions and explanations of what the reader is seeing.**

In the terminal, enter `quarto render HW0.qmd --to pdf`. To hide the R code, type `execute: echo: false` in the Quarto file header. Alternatively, in the RStudio console, enter `rmarkdown::render("HW0.qmd", "pdf_document")`. To hide the R code, type `echo = FALSE` in each bracket that initializes a code chunk.

(4) **Erase the PDF report and reproduce it but this time using $a = 1, b = 2, c = 5$.**

To erase the PDF report, enter `rm HW0.pdf` in the terminal. Then, to regenerate the PDF report using $a = 1, b = 2$, and $c = 5$, assign 1, 2, and 5 to variables a, b, and c respectively on lines 15-17 of this Quarto file.

(5) **Erase the PDF report and reproduce it but this time using $a = 1, b = 3, c = 2$.**

To erase the PDF report, enter `rm HW0.pdf` in the terminal. Then, to regenerate the PDF report using $a = 1, b = 3$, and $c = 2$, assign 1, 3, and 2 to variables a, b, and c respectively on lines 15-17 on this Quarto file.

(6) **Create an HTML page with the results for this last set of values, but this time showing the code.**

To show the R code, either type `execute: echo: true` (or delete `execute: echo: false`) in the header or type `echo = TRUE` (or delete `echo = FALSE`) in each bracket that initializes a code chunk. Then, in the terminal, enter `quarto render HW0.qmd --to html`, or in the RStudio console, enter `rmarkdown::render("HW0.qmd", "html_document")`.