

Problem Set 1: Quadratic Equations

In this lesson we will learn how to apply quadratic equation and graphically demonstrate that our solution is correct

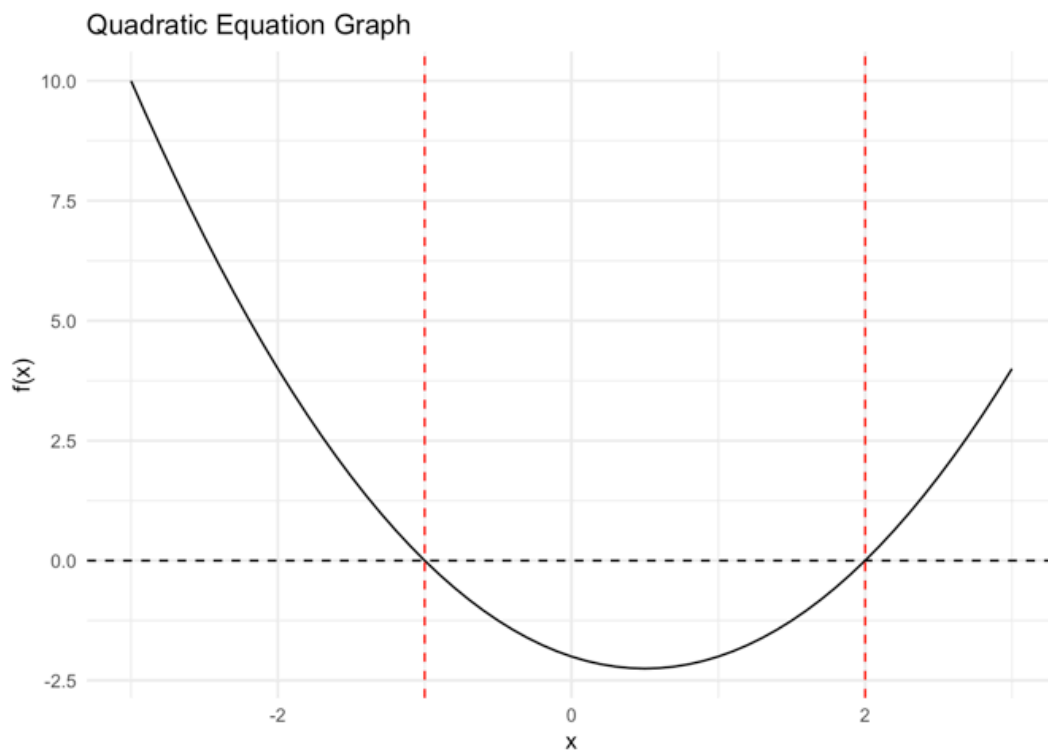
```
# Define the quadratic equation solver function
quadratic_solver <- function(a, b, c) {
  discriminant <- b^2 - 4*a*c

  if (discriminant < 0) {
    return(NULL) # No real solutions for complex roots
  } else {
    root1 <- (-b + sqrt(discriminant)) / (2*a)
    root2 <- (-b - sqrt(discriminant)) / (2*a)
    return(c(root1, root2))
  }
}

# Set the values for the first set of coefficients
a <- 1
b <- -1
c <- -2

# Solve the quadratic equation
solutions <- quadratic_solver(a, b, c)
cat("Solutions for the first set of coefficients:", solutions, "
```

Solutions for the first set of coefficients: 2 -1



Saving 7 x 5 in image

Changing variables to a=1, b=2, c=5

```
# Set the values for the first set of coefficients
a <- 1
b <- 2
c <- 5

# Solve the quadratic equation
solutions <- quadratic_solver(a, b, c)
cat("Solutions for the first set of coefficients:", solutions, "
```

Solutions for the first set of coefficients:

```
# Plot the graph for the first set of coefficients
library(ggplot2)

x_values <- seq(-3, 3, 0.1)
y_values <- a * x_values^2 + b * x_values + c

df <- data.frame(x = x_values, y = y_values)

ggplot(df, aes(x, y)) +
  geom_line() +
  geom_hline(yintercept = 0, linetype = "dashed") +
```

```
geom_vline(xintercept = solutions, linetype = "dashed", color = "red",
  labs(title = "Quadratic Equation Graph",
    x = "x",
    y = "f(x)") +
  theme_minimal())
```



Changing variables to a=1, b=3, c=2

```
# Set the values for the first set of coefficients
a <- 1
b <- 3
c <- 2

# Solve the quadratic equation
solutions <- quadratic_solver(a, b, c)
cat("Solutions for the first set of coefficients:", solutions, '\n')
```

Solutions for the first set of coefficients: -1 -2

```
# Plot the graph for the first set of coefficients
library(ggplot2)

x_values <- seq(-3, 3, 0.1)
y_values <- a * x_values^2 + b * x_values + c
```

```
df <- data.frame(x = x_values, y = y_values)

ggplot(df, aes(x, y)) +
  geom_line() +
  geom_hline(yintercept = 0, linetype = "dashed") +
  geom_vline(xintercept = solutions, linetype = "dashed", color = "red") +
  labs(title = "Quadratic Equation Graph",
       x = "x",
       y = "f(x)") +
  theme_minimal()
```

