Quadratic Function

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2022-05-31

```
knitr::opts_chunk$set(echo = T, message = F, warning = F)
```

A quadratic equation is an equation of the form $ax^2 + bx + c = 0$, where `a`, `b`, and `c` are constants. One can solve the value of `x` given the values of `a`, `b` and `c` using the quadratic formula below:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \qquad where \quad a \neq 0$$

The roots are real and distinct when the discriminant $b^2 - 4ac$ is equal to zero, real and equal when the discriminant is equal to 0 and complex if the discriminant is less than zero. The function is:

```
quadratic= function(a,b,c){
  x=(-b+c(-1,1)*(sqrt(b^2-(4*a*c))))/(2*a)
  x
}
```

Lets take for example the equation $x^2 - 45x + 324$. The roots are real and distinct. In this case, `a=1`, `b=-45` and `c=324`. We pass a,b and c as the arguments of the function and the pair of roots is generated.

```
quadratic(a=1,b=-45,c=324)
```

```
## [1]  9 36
```

However, this will not work in the case of complex roots. The below function will tell you if the roots are complex.

```
quadratic2 = function(a, b, c){
  discriminant = b^2 - 4*a*c
  x1 = (-b - sqrt(discriminant))/(2*a)
  x2 = (-b + sqrt(discriminant))/(2*a)
  if (discriminant < 0){
    cat("The roots are complex");

  }
  else

  cat("The two roots are", x1, "and", x2, "\n");
}
```

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