

Galatonova_HW1_applied_statistics

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Creating dots and figure

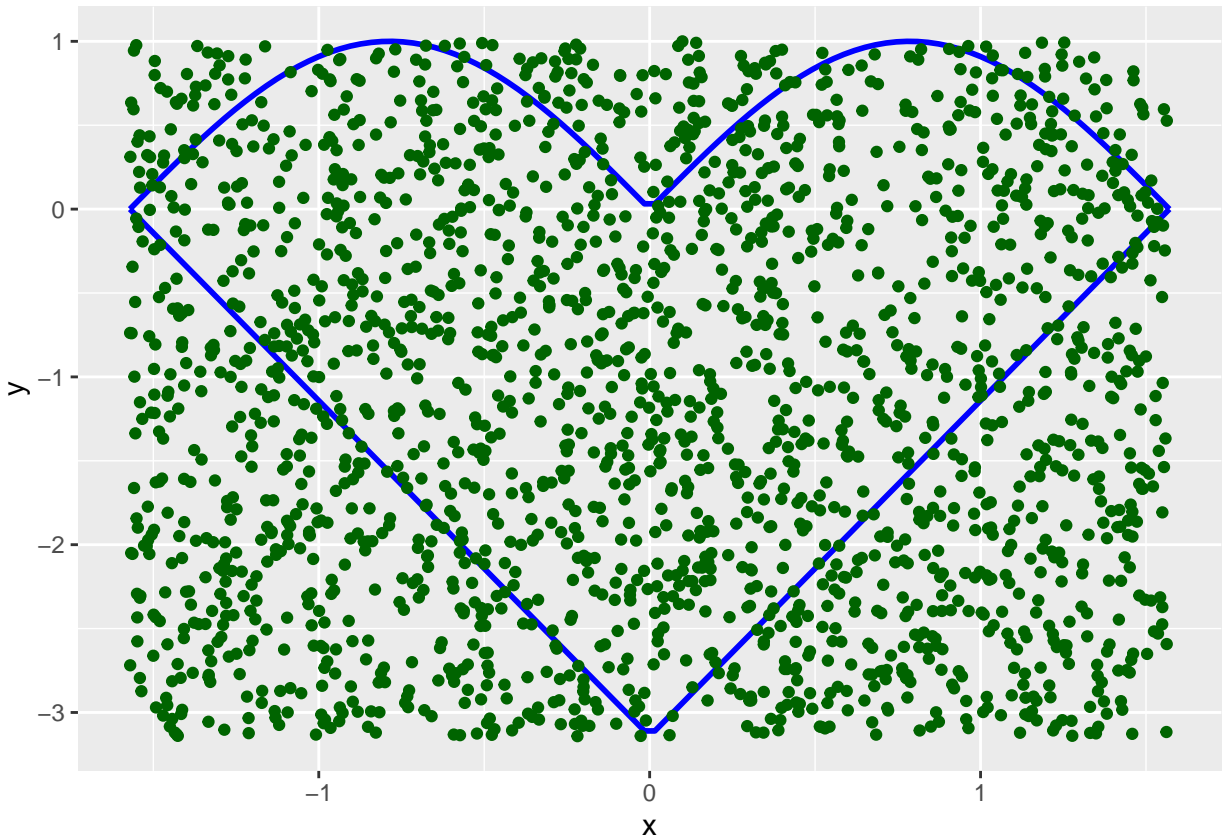
```
X <- seq(from=-pi/2, to=pi/2, length.out=100)
Y <- 2*abs(X) - pi
Z <- abs(sin(2*X))

dots_x_coord <- runif(2000, min= -pi/2, max = pi/2)
dots_y_coord <- runif(2000, min = -pi, max = 1)

dots <- data.frame(x = dots_x_coord, y = dots_y_coord)
figure1 <- data.frame(x=X, y=Y)
figure2 <- data.frame(x=X, y=Z)
```

Visualizing dots and figure

```
ggplot() +
  geom_line(data = figure1, aes(x=x, y=y), colour="blue", size=1) +
  geom_line(data = figure2, aes(x=x, y=y), colour="blue", size=1) +
  geom_point(data = dots, aes(x=x, y=y), colour="darkgreen")
```



Counting dots inside the figure

```
dots_count = 0
for(i in 1:2000) {
  X = dots_x_coord[i]
  Y <- 2*abs(X) - pi
  Z <- abs(sin(2*X))
  if(dots_y_coord[i]<=Z & dots_y_coord[i]>=Y) {
    dots_count <- dots_count + 1
  }
}
cat("Number of dots:", dots_count)
```

```
## Number of dots: 1041
```

Calculation of the figure area

```
external_rectangle_area <- pi * (1 + pi) # horizontal side of rectangle with dots is pi (pi/2+pi/2) and
dots_ratio <- dots_count / 2000 # number of dots inside figure / total number of dots
figure_area <- external_rectangle_area * dots_ratio
cat("Area of external rectangle:", external_rectangle_area)
```

```
## Area of external rectangle: 13.0112
```

```
cat("Area of the figure:", figure_area)
```

```
## Area of the figure: 6.772328
```