M339G: April 12th, 2024.

0.632.

Say, we are doing bootstrap.

Let our original sample be $x_1, x_2, \ldots, x_n$

With the bootstrap, we draw with replacement from the original sample.

Focusing on, say, x_1, the probability of it not being chosen in one draw is:

$$1 - \frac{1}{n}$$

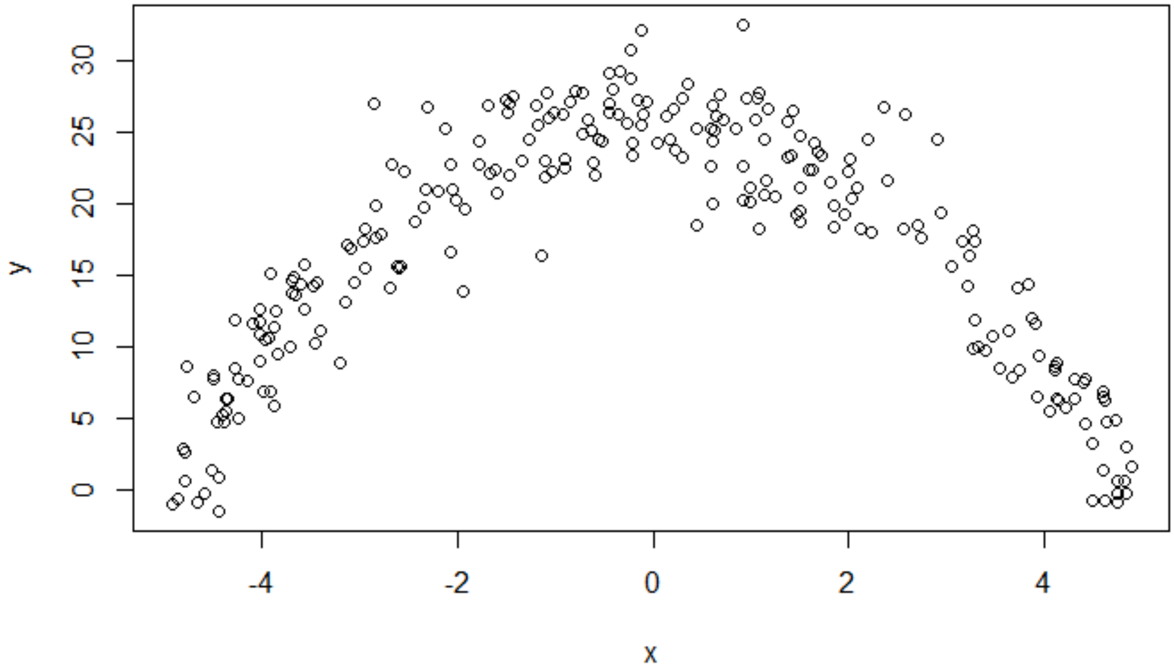
But, there are n independent draws. So, the total probability of never choosing x_1 is

$$\left(1 - \frac{1}{n}\right)^n \xrightarrow[n\to\infty]{} e^{-1} \approx 0.368$$

So, $1 - e^{-1} \cong 0.632$ is the proportion (on average) of the data points that end up in any bootstrapped sample.

39. You are given a dataset with two variables, which is graphed below. You want to predict *y* using *x*.

Determine which statement regarding using a generalized linear model (GLM) or a random forest is true.



✗ (A) A random forest is appropriate because the dataset contains only quantitative variables. Qualitative are better addressed in RF.

✗ (B) A random forest is appropriate because the data does not follow a straight line.

The opposite is true.

✗ (C) A GLM is not appropriate because the variance of *y* given *x* is not constant. The variance looks pretty constant.

✗ (D) A random forest is appropriate because there is a clear relationship between *y* and *x*.

└ could be anything.

(E) A GLM is appropriate because it can accommodate polynomial relationships.

In trees in general:

$$f(x) = \sum_{j=1}^{J} c_j \mathbb{I}_{[x \in R_j]}$$

all regions