

R and Statistics - Exercises

- 1) Create the samples (hint: Use Sample function for questions a to c)
 - a) Rolling a fair die 3000 times
 - b) Choose 27 random numbers from 30 to 70
 - c) Flip a fair coin 1000 times
- 2) Let x be the normally distributed random variable with mean=0 and standard deviation =30 , with $n=100$
 - a) Plot the probability distribution of x assuming that the points are normally distributed with mean=0 and standard deviation=30
 - b) Plot the cumulative distribution points.
 - c) Input the probability 0.2 and obtain the number whose cumulative value matches this value (hint: `qnorm(0.2, mean=0, sd=30)`)
 - d) Compute the 50% quantile value using `qnorm` function
- 3) In the above example observe and briefly explain what happens to the normal distribution curve when you change the mean, the variance, or both simultaneously.
 - a. change SD to 15
 - b. change SD to 45
 - c. Change the mean to 50
 - d. Change the mean to -50
- 4) Draw a histogram of 5000 random variables normally distributed with given SD= 5 and mean=20 (hint : use `rnorm`)
- 5) Calculate the probability that a normally distributed random variable with mean 22 and variance 25
 - a) is greater than 29
 - b) is less than 17
 - c) is less than 15 or greater than 25
- 6) If the mean length of a sample of rock cod (a fish variety) is 30 inches and the variance is 4 inches, calculate the approximate probability that a certain rock cod is 31 in. long. Calculate the probability using the equation

a)
$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

(Hint: $1/(\sqrt{2\pi}) \cdot \sigma \cdot \exp(-((31 - \mu)^2/(2 \cdot \sigma^2)))$)

b) Verify the same using `dnorm()` function