

Lesson 13: Density Curves – Normal and Uniform

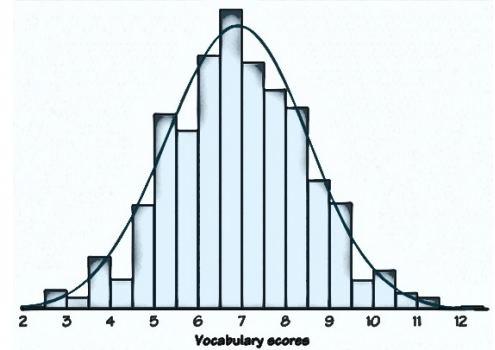
Daily Data Collection

What is the last digit of your phone number?

How long does it take you to complete a Sudoku puzzle?

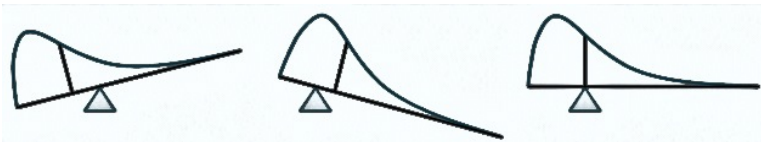
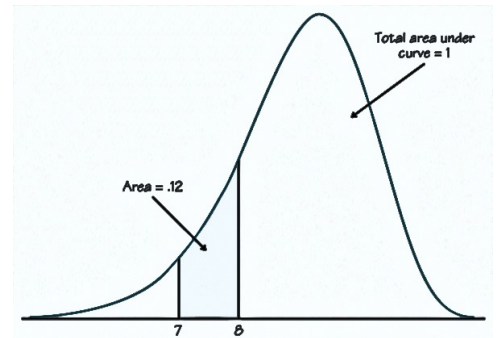
Density Curves

So far we have worked only with jagged histograms and stem plots to analyze data. As we begin to explore more fully the many statistical calculations and analyses one can perform on data it will become clear that working with smooth curves is much easier than jagged histograms. These smooth curves are called Density curves.

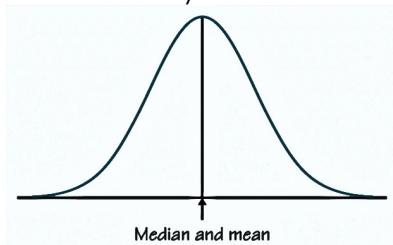


Characteristics of a density curve

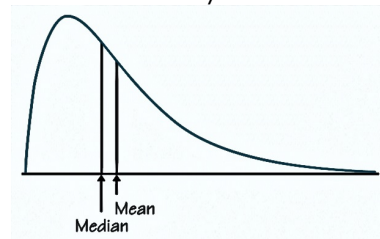
- ❖ A density curve is a smooth curve that describes the overall pattern of a distribution by showing what proportions of observations (not counts) fall into a range of values.
- ❖ Areas under a density curve represent proportions of observations
- ❖ The scale of a density curve is adjusted in such a way that the total area under the curve is always equal to 1
- ❖ The density curve is always on or above the horizontal axis.
- ❖ The median of a density curve is the equal areas point.
- ❖ The mean of a density curve is the balance point (like a see-saw) if the curve was made of solid material.



- ❖ The mean and the median are equal in a symmetric density curve.



- ❖ The mean and the median are not equal in a skewed density curve.



Normal Distribution

A density curve that is normally distributed has the following characteristics:

- Symmetric
- Single peak
- Bell shape
- Area under the curve is 1

The mean of a density curve (including the normal curve) is denoted by μ (the Greek lowercase letter mu) and the standard deviation is denoted by σ (the Greek lowercase letter sigma)

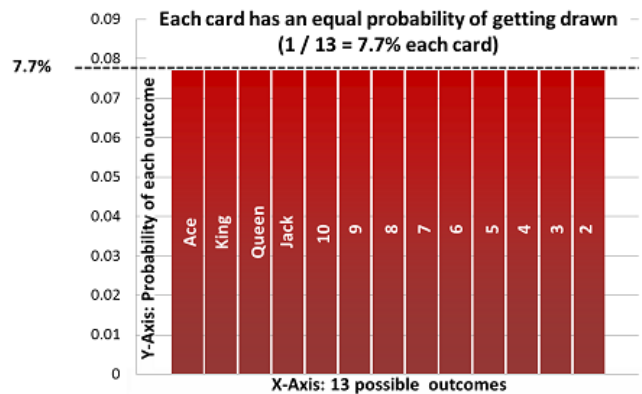
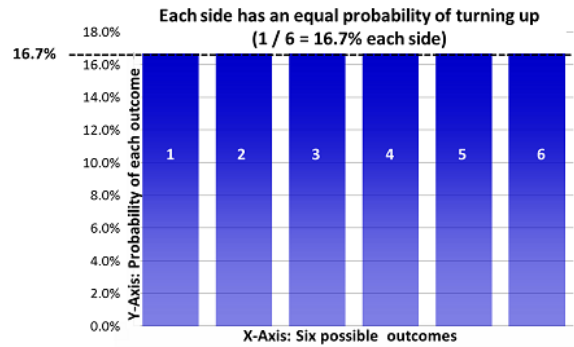
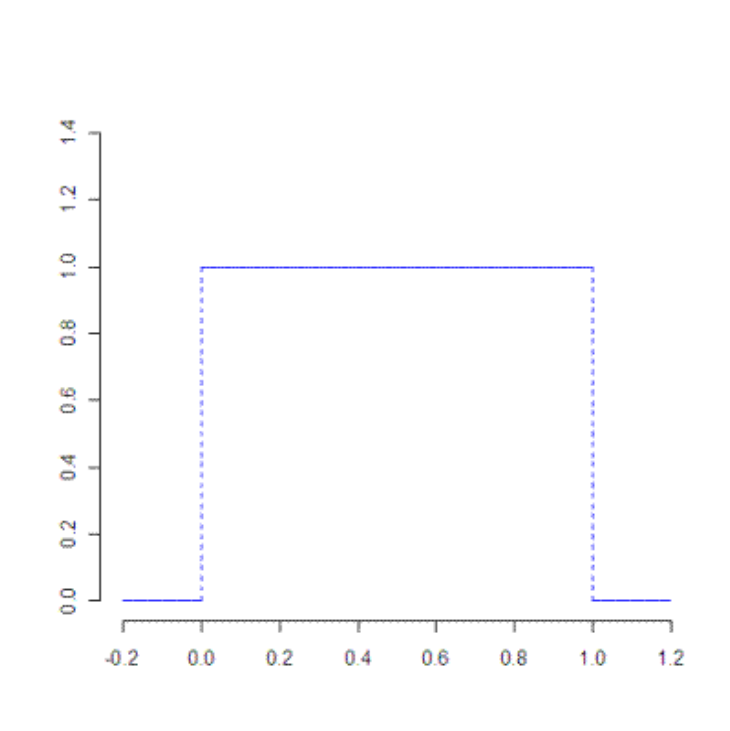
All Normal distributions have the same overall shape. Any differences can be explained by μ and σ .



Uniform Distribution:

A uniform distribution, also called a rectangular distribution, is a probability distribution that has constant probability. A density curve that is normally distributed has the following characteristics:

- Symmetric
- Rectangular in shape
- Area under the curve is 1



Class Data:

Create a Stem-plot for the two data sets and describe the shape of each.

Phone Digit Stem-plot

Sudoku Stem-plot

Shape of each:

Guided Practice:

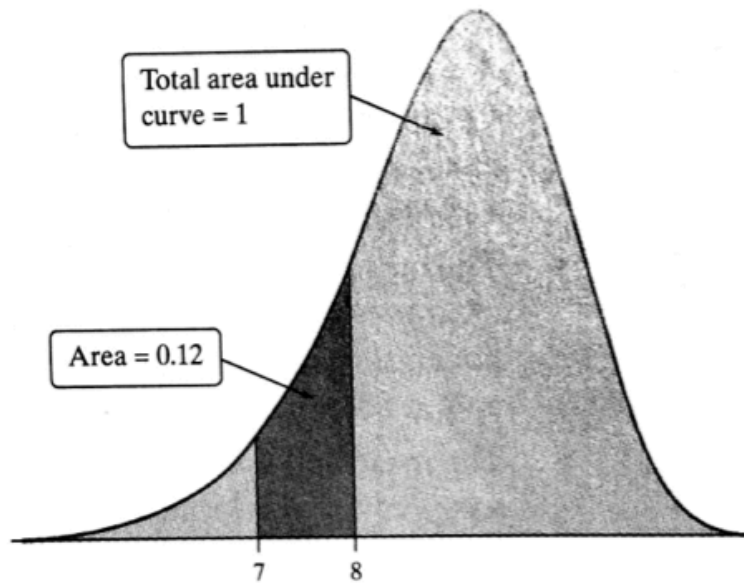
Suppose a random number N is taken from 690 to 850 in uniform distribution.

- a. Find the mean and median
- b. Find the area under the curve for values larger than 790

CHECK YOUR UNDERSTANDING

Use the figure shown to answer the following questions.

1. Explain why this is a legitimate density curve.
2. About what proportion of observations lie between 7 and 8?
3. Trace the density curve onto your paper. Mark the approximate location of the median.
4. Now mark the approximate location of the mean. Explain why the mean and median have the relationship that they do in this case.



THE RULES OF SUDOKU

Fill a number in to every cell in the grid, using the numbers 1 to 9

You can only use each number once in each row, each column, and in each of the 3x3 boxes

			2	6		7		1
6	8			7			9	
1	9				4	5		
8	2		1				4	
		4	6		2	9		
	5				3		2	8
		9	3				7	4
	4			5			3	6
7		3		1	8			

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