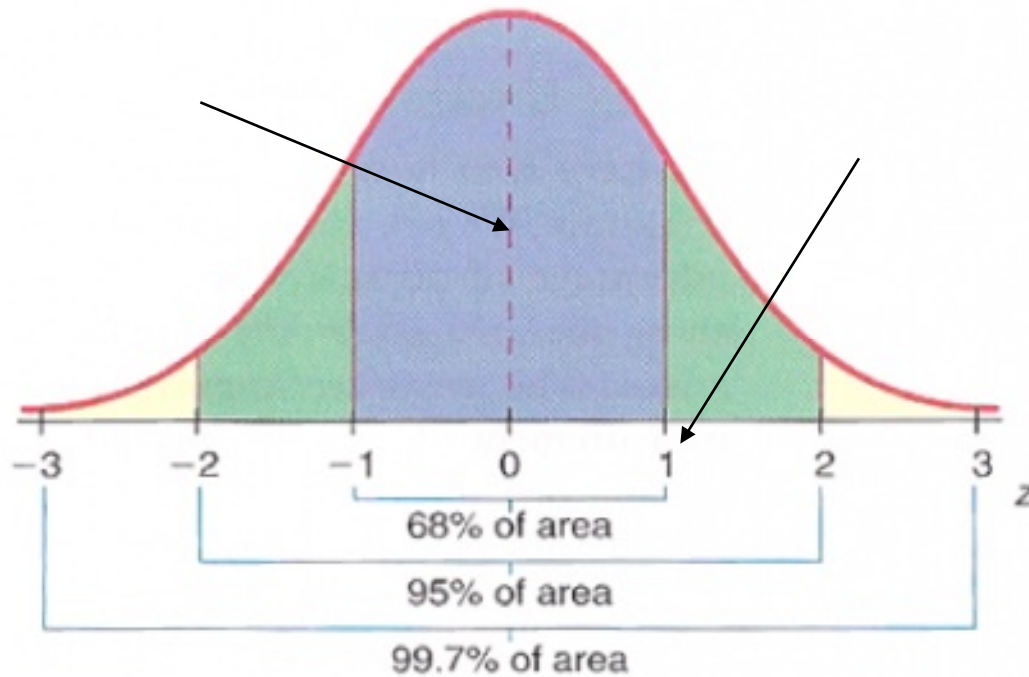


Chapter 5: Statistics

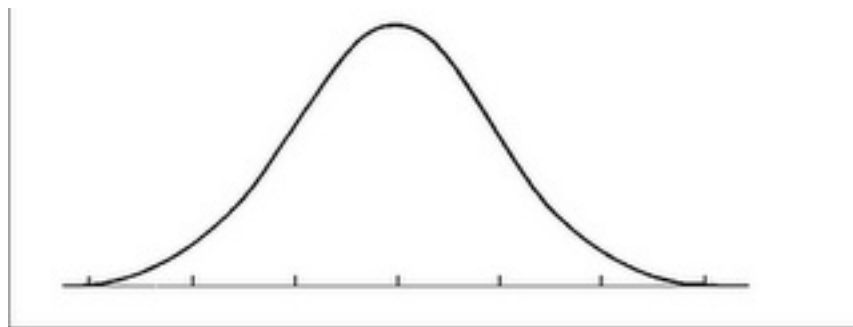
5.4 Normal Distribution

a graph of normal distribution is called the _____

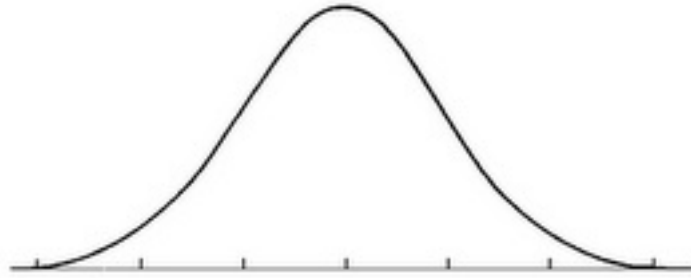
this type of distribution occurs often, especially in experimental data



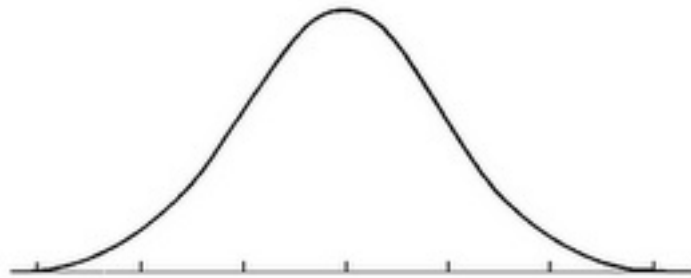
Example #1: A teacher is marking "on the curve" and wants a class average of 67%. If the standard deviation is 10, estimate how many students will earn an A?



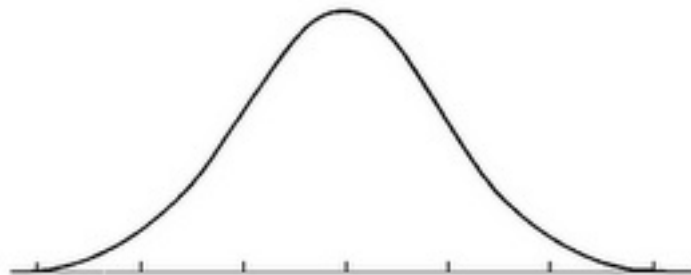
Example #2: Suppose scores on an IQ test are normally distributed. If the test has a mean of 100 and a standard deviation of 10, what is the probability that a person who takes the test will score between 90 and 110?



Example #3: An average light bulb manufactured by the Acme Corporation lasts 300 days with a standard deviation of 50 days. Assuming that bulb life is normally distributed, what is the probability that an Acme light bulb will burn out before 250 days?



Example #4: A machine is used to fill soda bottles. The amount of soda dispensed into each bottle varies slightly. Suppose the amount of soda dispensed into the bottles is normally distributed. If at least 99.7% of the bottles must have between 585 and 595 milliliters of soda, find the greatest standard deviation, to the nearest hundredth, that can be allowed.



How can you tell if your data is "normal"?

1. Draw a _____ and see if it makes a _____
2. Check to see if the _____ is close to the _____
3. Check to see if the _____ and _____ are true

Example #5: Ruth is planning to buy a new cellphone, but is concerned about how long the phone will last before it breaks. She does an extensive survey and finds the following data (in years):

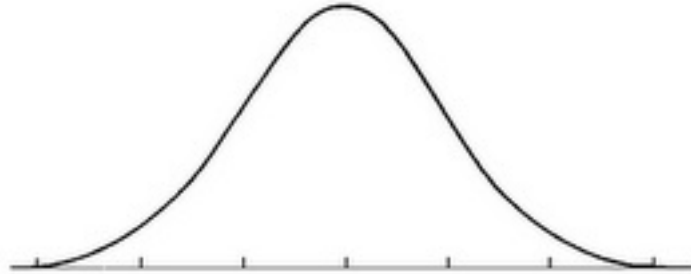
2.0 2.4 3.3 1.7 2.5 3.7 2.0 2.3 2.9 2.2
 2.3 2.7 2.5 2.7 1.9 2.4 2.6 2.7 2.8 2.5
 1.7 1.1 3.1 3.2 3.1 2.9 2.9 2.0 2.1 2.6
 2.6 2.2 2.7 1.8 2.4 2.5 2.4 2.3 2.5 2.6
 3.2 2.1 3.4 2.2 2.7 1.9 2.9 2.6 2.7 2.8

Interval	Interval (Years)	Midpoint (Years)	Frequency
$\mu - 3\sigma$ to $\mu - 2\sigma$			
$\mu - 2\sigma$ to $\mu - \sigma$			
$\mu - \sigma$ to μ			
μ to $\mu + \sigma$	2.5 - 3.0		
$\mu + \sigma$ to $\mu + 2\sigma$			
$\mu + 2\sigma$ to $\mu + 3\sigma$			

How likely is it that this phone will last a full three years?

Assignment:

1) The ages of members of a seniors' lawn bowling club are normally distributed. The mean is 65 years and the standard deviation is 3 years. Sketch the normal curve. What percent of the bowlers is in each of the following age groups?



a) 59 and 65 years old

b) 68 and 74 years old

c) older than 74 years

2) A teacher is analyzing these class results for three history tests. The results of all three tests were normally distributed.

Test	Mean (μ)	Standard Deviation (σ)
1	85	2.5
2	85	4.9
3	75	2.5

Determine Jasmine's marks on each test, given the information. Round to the nearest percent.

Test	Jasmine's Mark	Jasmine's Percentage
1	$\mu + 2\sigma$	
2	$\mu - 1.5\sigma$	
3	$\mu + 3.5\sigma$	

3) Is the data in each set normally distributed? Use a frequency polygon to help you explain.

a)

Interval	11-15	16-20	21-25	26-30	31-35	36-40
Frequency	4	6	15	18	9	4

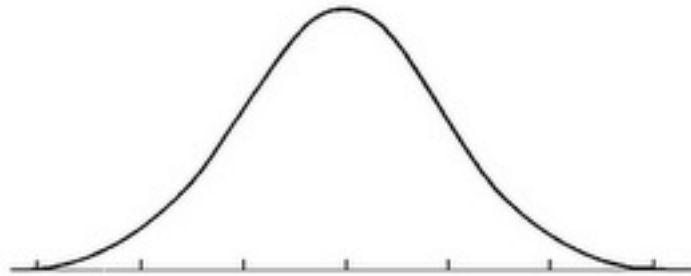
b)

Interval	20-24	25-29	30-34	35-39	40-44	45-49
Frequency	1	5	5	2	3	4

c)

Interval	1-6	7-12	13-18	19-24	25-30	31-36
Frequency	1	8	5	8	4	4

4) A manufacturer offers a warranty on its toasters. The toaster has a mean lifespan of 6.0 years, with a standard deviation of 0.5 years. How long should the toasters be covered by the warranty if the manufacturer wants to repair no more than 2.5% of the toasters sold?



5) Reggie recorded the points he scored playing basketball during the year.

22, 24, 23, 10, 0, 0, 3, 36, 28, 15, 0, 28
32, 12, 11, 10, 31, 10, 32, 29, 14, 22, 21, 30

a) Use your calculator to determine the mean and standard deviation of the set of data.

b) Complete the frequency chart:

Interval	Interval (Points)	Midpoint (Points)	Frequency
$\mu - 3\sigma$ to $\mu - 2\sigma$			
$\mu - 2\sigma$ to $\mu - \sigma$			
$\mu - \sigma$ to μ			
μ to $\mu + \sigma$			
$\mu + \sigma$ to $\mu + 2\sigma$			
$\mu + 2\sigma$ to $\mu + 3\sigma$			

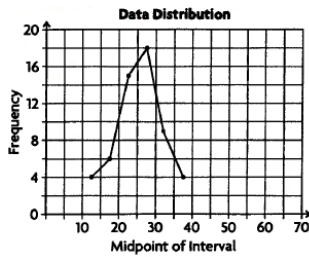
c) Create a frequency polygon, using the grid provided.

d) Are Reggie's basketball scores normally distributed? Explain your answer.

e) If Reggie plays 100 games, in how many games would you expect him to score 30 or more points?

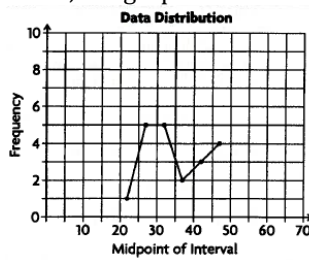
Answer Key

1. a) 47.5% b) 15.85% c) 0.15%
 2. 90, 78,84



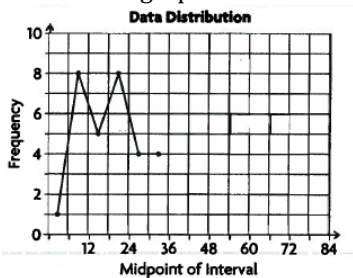
3.a.

The two middle intervals represent 60% of the data. The four middle intervals represent 86% of the data. Therefore, the data is normally distributed, since the intervals are close to 68% and 95% of the data. Also, the graph of the data approximates a bell shape.



3.b.

The two middle intervals represent 35% of the data. The four middle intervals represent 75% of the data. Therefore, the data is not normally distributed, since the intervals are not close to 68% and 95% of the data. The graph of the data confirms this.



3.c.

The two middle intervals represent 43% of the data. The four middle intervals represent 83% of the data. Therefore, the data is not normally distributed, since the intervals are not close to 68% and 95% of the data. The graph of the data confirms this.

4. 5 years

5. mean = 18.5goals, sd = 11.1goals

The data is normally distributed, since the intervals are close to 68% and 95% of the data. The graph of the data confirms this, because it is approximately bell-shaped.