

EXCEL SURVIVAL NOTES FOR MAT 120—FREQUENCY DISTRIBUTIONS
For Excel 2007 Users

For frequency distributions, you may be asked to calculate such things as class limits, midpoints, class frequencies, cumulative frequencies, relative frequencies, mean, standard deviation, median, and mode. Excel is capable of calculating these numbers for you.

Calculating lower and upper class limits

Before calculating class limits you will need to know:

- The desired number of classes. Your textbook or instructor will usually tell you how many classes to use for each problem.
- The class width. Refer to your textbook or class notes for instructions on how to determine an appropriate class width.

As an example, we will use the following data set:

15, 18, 12, 32, 41, 24, 48, 35, 35, 29, 18, 42, 27, 42, 38, 31, 10, 39, 32, 35

	A	B
1	Data	
2	15	
3	18	
4	12	
5	32	
6	41	
7	24	
8	48	
9	35	
10	35	
11	29	
12	18	
13	42	
14	27	
15	42	
16	38	
17	31	
18	10	
19	39	
20	32	
21	35	

- For this data, we will make **4 classes**.
- We will use **10 as the class width**.
- We will use **11, the smallest data item, as the lower limit for the smallest class**.
- Begin by inputting the original data items into one column. In this example, column **A** is being used.

To create a column of lower class limits:

- In the cell where you want the list to begin, type the lower class limit for the first class. In our example, we will use cell B3.
- Move cursor to the next cell in the column.
- Into this cell, put the **class width + the location of the cell containing the first lower limit**.
- Select the cell containing the lower limit for the second class. Copy and paste it to the remaining cells where lower limits are to be located. Excel will calculate and fill in the remaining lower limits.

	A	B
1	Data	Lower
2	15	Limits
3	18	11
4	12	21
5	32	
6	41	
7	24	

This is the lower limit for the first class.

Calculate by typing = **10 + B3**.

class width cell containing the lower limit of the first class

	A	B
1	Data	Lower
2	15	Limits
3	18	11
4	12	21
5	32	31
6	41	41
7	24	

Select cell B4. Select the **Copy icon**, located at the **Home** tab at the top of the screen. When the + symbol appears in B4, highlight the cells where the rest of the lower limits will go. Select the **Paste icon**, located at the **Home** tab at the top of the screen. Excel will calculate and fill in the remaining lower limits.

The process for creating a column of upper class limits is almost identical to the process for creating the column of lower limits.

- In the cell where you want the list to begin, type the upper class limit for the first class.
- Move cursor to the next cell in the column.
- Into this cell, put the **class width + the location of the cell containing the first upper limit**.
- Select the cell containing the upper limit for the second class. Copy and paste it to the remaining cells where upper limits are to be located. Excel will calculate and fill in the remaining upper limits.

	A	B	C
1	Data	Lower	Upper
2	15	Limits	Limits
3	18	11	20
4	12	21	30
5	32	31	
6	41	41	
7	24		

This is the upper limit for the first class.

Calculate by typing = 10 + C3. 10 is the class width. C3 is the cell containing the upper limit of the first class.

	A	B	C
1	Data	Lower	Upper
2	15	Limits	Limits
3	18	11	20
4	12	21	30
5	32	31	40
6	41	41	50
7	24		

- Select cell C4.
- Select the **Copy icon**.
- When the + symbol appears in C4, highlight the cells where the rest of the upper limits will go.
- Select the **Paste icon**. Excel will calculate and fill in the remaining upper limits.

Calculating midpoints

The class midpoint is the average of the lower and upper limits for the class.

- Position the cursor in the cell where you want the midpoint for the first class to go. Calculate the first midpoint. Use $\frac{(\text{lower limit} + \text{upper limit})}{2}$.
- Select the cell where this first midpoint has been calculated. Copy and paste it to the remaining cells where midpoints should go. Excel will calculate and fill in these cells with the appropriate midpoints.

	A	B	C	D
1	Data	Lower	Upper	Class
2	15	Limits	Limits	Midpoints
3	18	11	20	15.5
4	12	21	30	
5	32	31	40	
6	41	41	50	
7	24			

Calculate by typing $=(B3+C3)/2$. B3 is the location of the lower limit for the first class; C3 is the location of the upper limit.

	A	B	C	D
1	Data	Lower	Upper	Class
2	15	Limits	Limits	Midpoints
3	18	11	20	15.5
4	12	21	30	25.5
5	32	31	40	35.5
6	41	41	50	45.5
7	24			

Select cell D3. Select the **Copy icon**. When the + symbol appears in D3, highlight the cells where the rest of the midpoints will go. Select the **Paste icon**. Excel will calculate and fill in the remaining midpoints.

Calculating frequencies

The **FREQUENCY** function in Excel makes it quick and easy to calculate class frequencies.

- Select the cells where you want the frequencies to go.
- Select the **FREQUENCY** function from the list of available functions at *fx*.
- When Excel asks for **data array**, select the cells where the original data items are located.
- When Excel asks for **bins array**, select the cells where the **upper limits** are located.
- **Warning, warning, warning!!! At this point do not select Ok or Enter.** If you want the frequencies to be calculated correctly, you must use **CTRL-SHIFT-ENTER**.

	A	B	C	D	E
1	Data	Lower	Upper	Class	
2	15	Limits	Limits	Midpoints	Frequency
3	18	11	20	15.5	
4	12	21	30	25.5	
5	32	31	40	35.5	
6	41	41	50	45.5	
7	24				
8	48				
9	35				
10	35				
11	29				
12	18				
13	42				
14	27				
15	42				
16	38				
17	31				
18	10				
19	39				
20	32				
21	35				

Select cells E3 through E6, the cells where the frequencies are to go.

At *fx* select **FREQUENCY**.

For **data array**, select A2 through A21, the cells where original data values are located.

For **bins array**, select C3 through C6, the cells where upper limits are located.

At this point, you must use **CTRL-SHIFT-ENTER**. Remember that OK or Enter won't produce the desired result!

E
Frequency
5
3
8
4

The frequency column should now look like this.

Calculating relative frequencies

Begin by getting the sum of the individual frequencies. The sum of the individual frequencies is known as the total frequency.

- Position the cursor in the cell where you want the total frequency to be inserted. Select the **SUM** function at *fx* or Σ from the ribbon at the top of the screen.
- When Excel asks for **Number 1**, select the cells where the frequencies are located. Then select OK or Enter. The total frequency will appear in this cell.
- Position the cursor in the cell where you want the first relative frequency to appear. Calculate the relative frequency by dividing the cell containing the individual class frequency by the cell containing the total frequency. Use \$ in front of both the letter and number denoting the cell that contains the total frequency. Using \$ symbols tells Excel not to change the value of the total frequency when copying and pasting.
- Copy and paste to the remaining cells where relative frequencies should go.

	A	D	E
1	Data	Class	
2	15	Midpoints	Frequencies
3	18		5
4	12		3
5	32		8
6	41		4
7	24		
8	48	Total Freq.	20

At **fx**, select **SUM**.

At **Number 1**, select E3 through E6, the cells containing the class frequencies.

	A	D	E	F
1	Data	Class		Relative
2	15	Midpoints	Frequencies	Frequency
3	18	15.5	5	.25
4	12	25.5	3	
5	32	35.5	8	
6	41	45.5	4	
7	24			
8	48	Total Freq.	20	

Calculate by typing **=E3/\$E\$8**. E3 is the location of the class frequency. E8 is the location of the total frequency. By using a \$ before E and before 8, you are telling Excel that it should always use the numerical value in cell E8 as the divisor.

	A	D	E	F
1	Data	Class		Relative
2	15	Midpoints	Frequencies	Frequency
3	18	15.5	5	.25
4	12	25.5	3	.15
5	32	35.5	8	.40
6	41	45.5	4	.20
7	24			
8	48	Total Freq.	20	

Select cell F3. Select the **Copy icon**. When the **+** symbol appears in F3, highlight the cells where the rest of the relative frequencies will go. Select the **Paste icon**. Excel will calculate and fill in the remaining relative frequencies.

To specify the desired number of decimal places:

- Select the cells containing the relative frequencies.
- Go to **Format** on the **Home** tab at the top of the screen.
- Select **Format Cells**.
- Select the **Number** tab at the top of the dialog box.
- Select **Number** from the category choices.
- Select the desired number of decimal places.

Calculating cumulative frequencies

- Position the cursor in the cell where the first cumulative frequency value will go. Into this cell, copy the cell containing the frequency of the first class.
- In the cell where the second cumulative frequency will go, copy the cell containing the first cumulative frequency + the cell containing the frequency for the second class.
- Select the cell containing the second cumulative frequency. Copy and paste to the remaining cumulative frequency cells.

	A	E	G
1	Data		Cumulative
2	15	Frequencies	Frequencies
3	18	5	5
4	12	3	8
5	32	8	
6	41	4	
7	24		
8	48	20	

Type **= E3**. E3 is the location of the frequency of the first class.

Calculate by typing **= G3+E4**. G3 is the location of the previous entry in the cumulative frequency column. E4 is the frequency of the second class.

	A	E	G
1	Data		Cumulative
2	15	Frequencies	Frequencies
3	18	5	5
4	12	3	8
5	32	8	16
6	41	4	20
7	24		
8	48	20	

Select cell G4. Select the **Copy icon**. When the + symbol appears in G4, highlight the cells where the remaining cumulative frequencies will go. Select the **Paste icon**. Excel will calculate and fill in the cumulative frequencies.

Calculating the mean, standard deviation, median, mode

To make these calculations easy, begin a new column in which each midpoint is listed as many times as the frequency of the class that it represents. All of the midpoints may be listed in one continuous column, or, as is shown in the illustration below, you may make a separate column for each class.

	A	G	H	I	J	K
1	Data		15.5	25.5	35.5	45.5
2	15		15.5	25.5	35.5	45.5
3	18		15.5	25.5	35.5	45.5
4	12		15.5		35.5	45.5
5	32		15.5		35.5	
6	41				35.5	
7	24				35.5	
8	48				35.5	
9	35					

15.5 is listed 5 times because it represents the class whose frequency is 5.
 25.5 is listed 3 times because it represents the class whose frequency is 3.
 35.5 represents the class whose frequency is 8, and 45.5 represents the class whose frequency is 4.

To calculate the mean:

- Position the cursor in the cell where you want the mean to go. Select the **AVERAGE** function at **fx**.
- When Excel asks for **Number 1**, select the cells where the midpoints are located. Then select OK or Enter. The mean will appear in the cell.

	H	I	J	K	L	M
1	15.5	25.5	35.5	45.5	Mean	
2	15.5	25.5	35.5	45.5	Sample Standard Deviation	
3	15.5	25.5	35.5	45.5	Population Standard Deviation	
4	15.5		35.5	45.5	Median	
5	15.5		35.5		Mode	
6			35.5			
7			35.5			
8			35.5			
9						

Select cell where the mean is to go.

At **fx**, select **AVERAGE**.

At **Number 1**, select H1 through K8, and press ENTER.

L	M
Mean	31
Sample Standard Deviation	
Population Standard Deviation	
Median	
Mode	

Excel will calculate and enter the mean.

By replacing **AVERAGE** with other appropriate statistical functions, you can repeat the above process to find the sample standard deviation, population standard deviation, median, and mode for the frequency distribution.

L	M
Mean	31
Sample Standard Deviation	10.9904265
Population Standard Deviation	10.7121426
Median	35.5
Mode	35.5

Sample standard deviation uses the **STDEV** function.

Population standard deviation uses the **STDEV.P** function.

Median uses the **MEDIAN** function.

Mode uses the **MODE** function.