How to calculate Sample Variance (S^2) and Standard Deviation (S) using Excel

Variance (S^2)	=	$\frac{\sum(x_i-\bar{x})^2}{n-1}$	S =	$\sqrt{S^2}$	= $\sqrt{\frac{\sum(x_i-\bar{x})^2}{n-1}}$

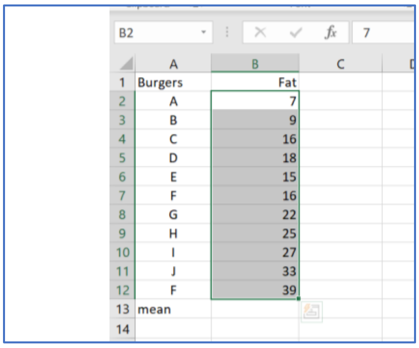
Question: The following data represent the total fat for burgers items from a sample of fast-food chains. Find the variance, and standard deviation.

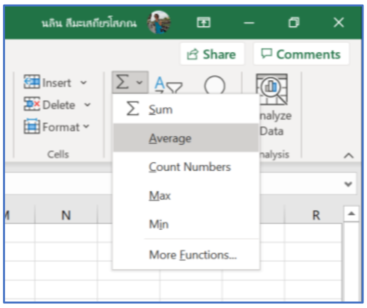
7, 9, 16, 18, 15, 16, 22, 25 27, 33, 39

Sample Variance (S^2) Method 1:

Step 1 Enter all data in Excel software program

Step 2: Find the mean by using the AVERAGE function: **=AVERAGE(B2:B12)**

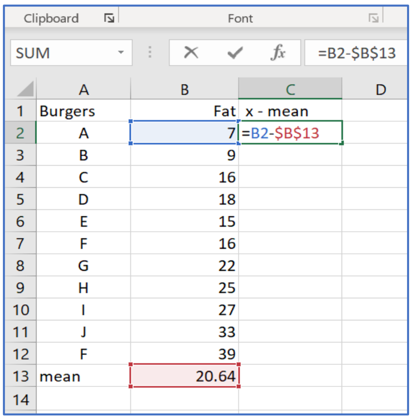


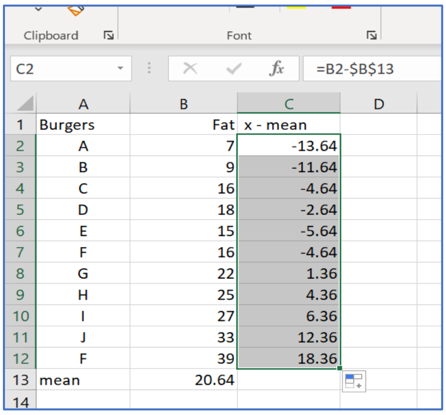


The average (mean) goes to any empty cell, say B13.

Step 3: **Subtract the mean (average) from each number in the sample:**

- move cursor to column C2
- Type: **=B2-B13** (mean value is in col B13, we will lock as a constant value)
- Click Enter. (You shall see the value of ***x-mean*** = -13.64 in column C2)
- move cursor to the corner of column C2 and drag until col C12

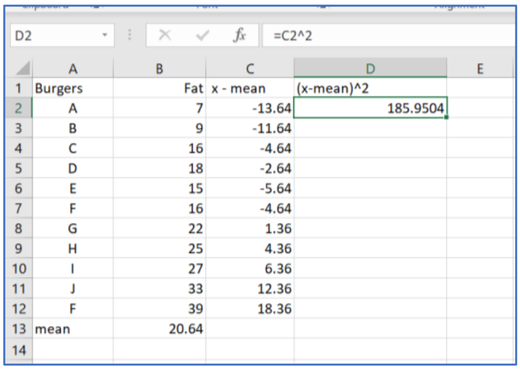




The differences go to column C, beginning in C2.

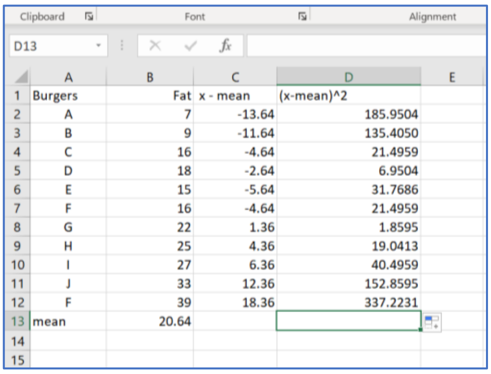
Step 4: Square each difference and put the results to column **D**, beginning in **D2**:

- Move cursor to column **D2**
- Type: **=C2^2**
- Click Enter. (You shall see the value of **(x-mean)**^{2} = 185.9504 in column D2)
- move cursor to the corner of column D2 and drag until col D12



D2 | =C2^2

	A	B	C	D
1	Burgers	Fat	x - mean	(x-mean)^2
2	A	7	-13.64	185.9504
3	B	9	-11.64	
4	C	16	-4.64	
5	D	18	-2.64	
6	E	15	-5.64	
7	F	16	-4.64	
8	G	22	1.36	
9	H	25	4.36	
10	I	27	6.36	
11	J	33	12.36	
12	F	39	18.36	
13	mean	20.64		

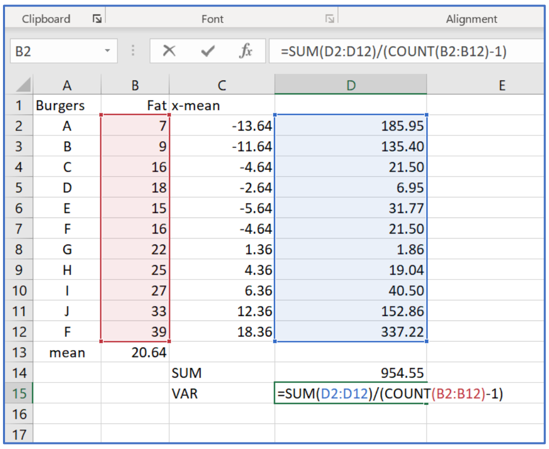


D13

	A	B	C	D
1	Burgers	Fat	x - mean	(x-mean)^2
2	A	7	-13.64	185.9504
3	B	9	-11.64	135.4050
4	C	16	-4.64	21.4959
5	D	18	-2.64	6.9504
6	E	15	-5.64	31.7686
7	F	16	-4.64	21.4959
8	G	22	1.36	1.8595
9	H	25	4.36	19.0413
10	I	27	6.36	40.4959
11	J	33	12.36	152.8595
12	F	39	18.36	337.2231
13	mean	20.64		

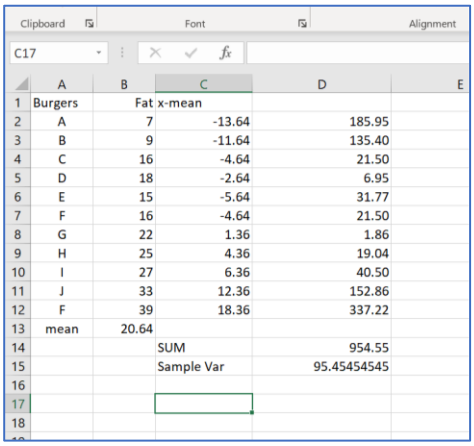
Step 5: Add up the squared differences and divide the result by (n – 1) or the number of items in the sample minus 1:

- Move cursor to column **D15**
- Type: **=SUM(D2:D12)/(COUNT(B2:B12) - 1)**
- **or =SUM(D2:D12)/(12-1)**
- Click Enter. (You shall see the value of variance 95.5455 in column D15)



B2 | =SUM(D2:D12)/(COUNT(B2:B12)-1)

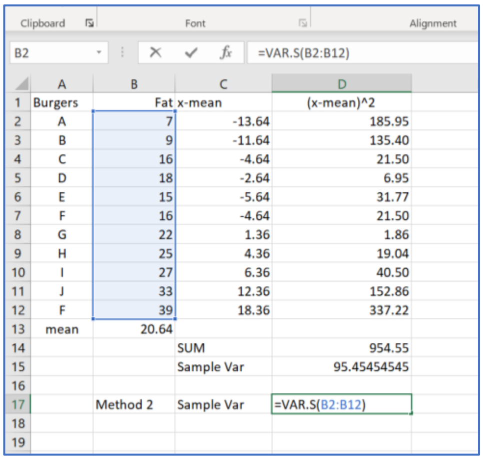
	A	B	C	D
1	Burgers	Fat	x-mean	
2	A	7	-13.64	185.95
3	B	9	-11.64	135.40
4	C	16	-4.64	21.50
5	D	18	-2.64	6.95
6	E	15	-5.64	31.77
7	F	16	-4.64	21.50
8	G	22	1.36	1.86
9	H	25	4.36	19.04
10	I	27	6.36	40.50
11	J	33	12.36	152.86
12	F	39	18.36	337.22
13	mean	20.64		
14			SUM	954.55
15			VAR	=SUM(D2:D12)/(COUNT(B2:B12)-1)



C17

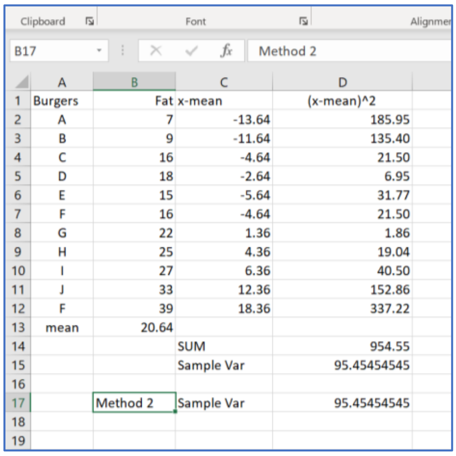
	A	B	C	D
1	Burgers	Fat	x-mean	
2	A	7	-13.64	185.95
3	B	9	-11.64	135.40
4	C	16	-4.64	21.50
5	D	18	-2.64	6.95
6	E	15	-5.64	31.77
7	F	16	-4.64	21.50
8	G	22	1.36	1.86
9	H	25	4.36	19.04
10	I	27	6.36	40.50
11	J	33	12.36	152.86
12	F	39	18.36	337.22
13	mean	20.64		
14			SUM	954.55
15			Sample Var	95.45454545

Method 2: Move cursor to D17 or any empty space and Type: =VAR.S(B2:B12)



B2 | =VAR.S(B2:B12)

	A	B	C	D
1	Burgers	Fat	x-mean	(x-mean)^2
2	A	7	-13.64	185.95
3	B	9	-11.64	135.40
4	C	16	-4.64	21.50
5	D	18	-2.64	6.95
6	E	15	-5.64	31.77
7	F	16	-4.64	21.50
8	G	22	1.36	1.86
9	H	25	4.36	19.04
10	I	27	6.36	40.50
11	J	33	12.36	152.86
12	F	39	18.36	337.22
13	mean	20.64		
14			SUM	954.55
15			Sample Var	95.45454545
16				
17		Method 2	Sample Var	=VAR.S(B2:B12)
18				
19				



B17 | Method 2

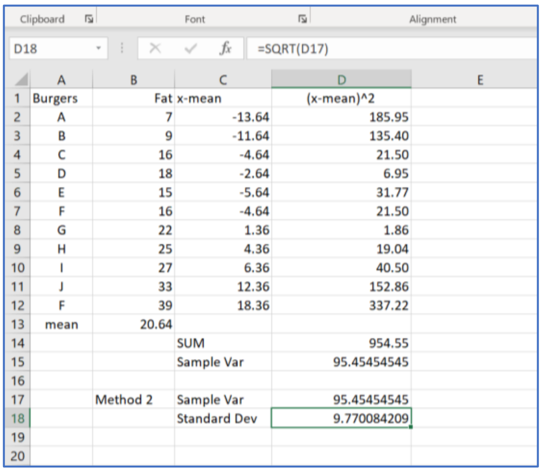
	A	B	C	D
1	Burgers	Fat	x-mean	(x-mean)^2
2	A	7	-13.64	185.95
3	B	9	-11.64	135.40
4	C	16	-4.64	21.50
5	D	18	-2.64	6.95
6	E	15	-5.64	31.77
7	F	16	-4.64	21.50
8	G	22	1.36	1.86
9	H	25	4.36	19.04
10	I	27	6.36	40.50
11	J	33	12.36	152.86
12	F	39	18.36	337.22
13	mean	20.64		
14			SUM	954.55
15			Sample Var	95.45454545
16				
17		Method 2	Sample Var	95.45454545
18				
19				

b) Find the value of sample standard deviation:

Find the value of **sample standard deviation**:

- Move cursor to column **D18**
- Type: **=SQRT(D17)**
- Click Enter.

You shall see the value of sample standard deviation 9.770084209 in column D18



D18 | =SQRT(D17)

	A	B	C	D	E
1	Burgers	Fat	x-mean	(x-mean)^2	
2	A	7	-13.64	185.95	
3	B	9	-11.64	135.40	
4	C	16	-4.64	21.50	
5	D	18	-2.64	6.95	
6	E	15	-5.64	31.77	
7	F	16	-4.64	21.50	
8	G	22	1.36	1.86	
9	H	25	4.36	19.04	
10	I	27	6.36	40.50	
11	J	33	12.36	152.86	
12	F	39	18.36	337.22	
13	mean	20.64			
14			SUM	954.55	
15			Sample Var	95.45454545	
16					
17		Method 2	Sample Var	95.45454545	
18			Standard Dev	9.770084209	
19					
20					

Sample Variance of fast-food chains = 95.4545

Sample standard deviation = 9.77