CASE STUDY: Bakery Data Analysis

1.1 Calculate the total sales for each day, add sorted list of unique bakery items and calculate the total sales for each item in cells with their percentage.

```
=SUMIF($B$2:$B, H2, $F$2:$F)
```

Transaction ID	Day	Date	Time	Item	Price		Day	Total Sales		Item	Total Sales	% of Total Sales
6484	Monday	2/13/2017	9:04:36	Coffee	$1.25		Monday	962.27		Alfajores	327.45	4.53%
6485	Monday	2/13/2017	9:33:24	Coffee	$1.25		Tuesday	691.44		Baguette	174.00	2.41%
6486	Monday	2/13/2017	9:33:59	Toast	$1.40		Wednesday	711.26		Bread	506.54	7.00%
6487	Monday	2/13/2017	9:47:23	Bread	$0.95		Thursday	840.24		Brownie	274.30	3.79%
6488	Monday	2/13/2017	10:03:39	Alfajores	$2.95		Friday	1292.88		Cake	991.50	13.71%
6488	Monday	2/13/2017	10:03:39	Bread	$0.95		Saturday	1426.06		Chicken Stew	226.80	3.14%
6490	Monday	2/13/2017	10:17:46	Coffee	$1.25		Sunday	1308.82		Coffee	1418.25	19.61%
6491	Monday	2/13/2017	10:37:21	Coffee	$1.25					Cookies	239.40	3.31%
6493	Monday	2/13/2017	10:42:14	chocolate	$2.10					Fudge	44.64	0.62%

Make sure the SUM% is 100% to check if the calculation is correct.

12	6495	Monday	2/13/2017	11:02:50	Pastry	$3.00					Jam	14.10	0.19%
13	6496	Monday	2/13/2017	11:04:08	Coffee	$1.25					Juice	128.31	1.77%
14	6498	Monday	2/13/2017	11:36:58	chocolate	$2.10					Muffin	99.84	1.38%
15	6498	Monday	2/13/2017	11:36:58	Bread	$0.95					Pastry	367.80	5.09%
16	6499	Monday	2/13/2017	11:37:41	Tea	$1.50					Sandwich	990.00	13.69%
17	6500	Monday	2/13/2017	11:46:11	Bread	$0.95					Scone	194.70	2.69%
18	6501	Monday	2/13/2017	11:48:03	Brownie	$3.25					Smoothies	86.40	1.19%
19	6502	Monday	2/13/2017	11:50:56	Cookies	$2.25					Soup	285.60	3.95%
20	6503	Monday	2/13/2017	11:56:07	Coffee	$1.25					Tea	392.40	5.43%
21	6504	Monday	2/13/2017	11:57:24	Coffee	$1.25					Toast	82.04	1.13%
22	6505	Monday	2/13/2017	12:06:20	Coffee	$1.25					Truffles	193.60	2.68%
23	6505	Monday	2/13/2017	12:06:20	Cake	$3.75							100.00%
24	6506	Monday	2/13/2017	12:07:12	Coffee	$1.25							

1.2 Add up the sales that occurred before and after noon for each day

```
=SUMIFS($F$2:$F, $B$2:$B, G2, $D$2:$D, "<12:00:00")
```

	Transaction ID	Day	Date	Time	Item	Price	Day	Total Sales	AM Sales	PM Sales	Item	Total Sales	% of Total Sales
2	6484	Monday	2/13/2017	9:04:36	Coffee	$1.25	Monday	$962.27	$170.15	$792.12	Alfajores	327.45	4.53%
3	6485	Monday	2/13/2017	9:33:24	Coffee	$1.25	Tuesday	$691.44	$164.76	$526.68	Baguette	174.00	2.41%
4	6486	Monday	2/13/2017	9:33:59	Toast	$1.40	Wednesda	$711.26	$164.30	$546.96	Bread	506.54	7.00%
5	6487	Monday	2/13/2017	9:47:23	Bread	$0.95	Thursday	$840.24	$229.38	$610.86	Brownie	274.30	3.79%
6	6488	Monday	2/13/2017	10:03:39	Alfajores	$2.95	Friday	$1,292.88	$409.24	$883.64	Cake	991.50	13.71%
7	6488	Monday	2/13/2017	10:03:39	Bread	$0.95	Saturday	$1,426.06	$569.50	$856.56	Chicken Stew	226.80	3.14%
8	6490	Monday	2/13/2017	10:17:46	Coffee	$1.25	Sunday	$1,308.82	$419.18	$889.64	Coffee	1418.25	19.61%

2.1 filter the data to have sales that occurred before 2/21/2017 in H ans I, after and on 2/21/2017 in J and K

```
=FILTER(E2:F, C2:C < DATE(2017,2,21))
```

	C	D	E	F	G	H	I	J	K
1	Date	Time	Item	Price		Item	Price	Item	Price
2	2/13/2017	9:04:36	Coffee	$1.25		Coffee	$1.25	Coffee	$1.50
3	2/13/2017	9:33:24	Coffee	$1.25		Coffee	$1.25	Coffee	$1.50
4	2/13/2017	9:33:59	Toast	$1.40		Toast	$1.40	Bread	$0.86
5	2/13/2017	9:47:23	Bread	$0.95		Bread	$0.95	Pastry	$2.70
6	2/13/2017	10:03:39	Alfajores	$2.95		Alfajores	$2.95	Coffee	$1.50
7	2/13/2017	10:03:39	Bread	$0.95		Bread	$0.95	Bread	$0.86
8	2/13/2017	10:17:46	Coffee	$1.25		Coffee	$1.25	Jam	$0.68
9	2/13/2017	10:37:21	Coffee	$1.25		Coffee	$1.25	Bread	$0.86
10	2/13/2017	10:42:14	Hot chocolate	$2.10		Hot chocolate	$2.10	Tea	$1.80

2.2 compute the average item price, standard devation, and sum for sales between February 13 and 20 and between Februrary 21 and 28, respectively. Perform a t-test in cell G5 to determine whether the average item sale price differed significantly before and after the price change.

```
=T.TEST(B2:B, D2:D, 2, 2)
```

	A	B	C	D	E	F	G	H
	2/13-2/19		2/20-2/28				2/13-2/19	2/20-2/28
	Item	Price	Item	Price		Mean	$2.26	$2.04
	Coffee	$1.25	Brownie	$2.93		Standard Deviation	1.419620083	1.00686916
	Coffee	$1.25	Coffee	$1.50		Sum	$1,990.60	$1,596.99
	Toast	$1.40	Coffee	$1.50		T-test	0.0003873172057	
	Bread	$0.95	Coffee	$1.50				
	Alfajores	$2.95	Fudge	$2.79				
	Bread	$0.95	Coffee	$1.50				

3.1 Create a list of the unique dates in the dataset, calculate the maximum number of inches of rain and total sales for the corresponding day in column I.

```
=MAXIFS($G$2:$G, $C$2:$C, I2)
```

	A	B	C	D	E	F	G	H	I	J	K
	Transaction ID	**Day**	**Date**	**Time**	**Item**	**Price**	**Inches of Rain**		**Date**	**Inches of Rain**	**Sale**
	6484	Monday	2/13/2017	9:04:36	Coffee	$1.25	0.00		2/13/2017	0	$161.60
	6485	Monday	2/13/2017	9:33:24	Coffee	$1.25	0.00		2/14/2017	0.02	$95.75
	6486	Monday	2/13/2017	9:33:59	Toast	$1.40	0.00		2/15/2017	0.65	$69.95
	6487	Monday	2/13/2017	9:47:23	Bread	$0.95	0.00		2/16/2017	0.01	$123.90
	6488	Monday	2/13/2017	10:03:39	Alfajores	$2.95	0.00		2/17/2017	0	$191.85
	6488	Monday	2/13/2017	10:03:39	Bread	$0.95	0.00		2/18/2017	0.01	$206.30
	6490	Monday	2/13/2017	10:17:46	Coffee	$1.25	0.00		2/19/2017	0	$161.80
	6491	Monday	2/13/2017	10:37:21	Coffee	$1.25	0.00		2/20/2017	0	$93.63
	6493	Monday	2/13/2017	10:42:14	Hot chocolate	$2.10	0.00		2/21/2017	0	$77.11
	6494	Monday	2/13/2017	10:53:02	Juice	$1.95	0.00		2/22/2017	0.12	$107.87
	6495	Monday	2/13/2017	11:02:50	Pastry	$3.00	0.00		2/23/2017	0.01	$86.16
	6496	Monday	2/13/2017	11:04:08	Coffee	$1.25	0.00		2/24/2017	0	$131.37
	6498	Monday	2/13/2017	11:36:58	Hot chocolate	$2.10	0.00		2/25/2017	0	$150.22
	6498	Monday	2/13/2017	11:36:58	Bread	$0.95	0.00		2/26/2017	0	$165.41

3.2 add up the amount of rainfall between February 13 and 19, between February 20 and 28 and calculate Correlate betwween total sales with total rainfall.

Date	Inches of Rain	Total Sales		Rain Before Price Change	Rain After Price Change	Correlation
2/13/2017	0	$161.60		0.69	0.13	-0.43
2/14/2017	0.02	$95.75				
2/15/2017	0.65	$69.95				
2/16/2017	0.01	$123.90				
2/17/2017	0	$191.85				
2/18/2017	0.01	$206.30				
2/19/2017	0	$161.80				

4.1 Analysis suggests the weather didn't cause the drop in sales either, but there might have been other outside factors that influenced sales. add variation to the quantities of items purchased in our models to see the effects of different sales volumes.

```
=RANDBETWEEN(0,2)
```

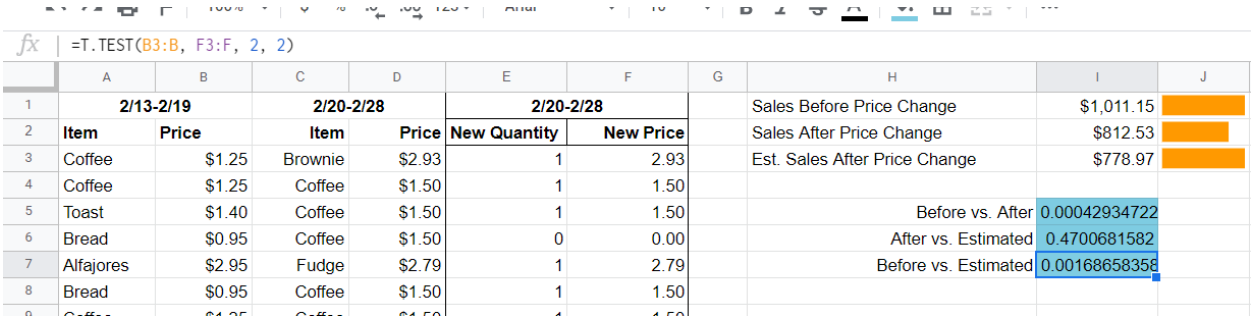
	2/13-2/19		2/20-2/28		2/20-2/28	
	Item	Price	Item	Price	New Quantity	New Price
	Coffee	$1.25	Brownie	$2.93	0	0.00
	Coffee	$1.25	Coffee	$1.50	2	3.00
	Toast	$1.40	Coffee	$1.50	1	1.50
	Bread	$0.95	Coffee	$1.50	0	0.00
	Alfajores	$2.95	Fudge	$2.79	1	2.79
	Bread	$0.95	Coffee	$1.50	2	3.00
	Coffee	$1.25	Coffee	$1.50	0	0.00
	Coffee	$1.25	Bread	$0.86	1	0.86

4.2 Calculate total sales before changing prices, after changing prices, sales based on your newly modeled data and create sparklines for each of the three sums.

```
=SPARKLINE(I1,{"charttype","bar";"max",MAX(I$1:I$3)})
```

	2/13-2/19		2/20-2/28		2/20-2/28				
	Item	Price	Item	Price	New Quantity	New Price		Sales Before Price Change	$1,011.15
	Coffee	$1.25	Brownie	$2.93	1	2.93		Sales After Price Change	$812.53
	Coffee	$1.25	Coffee	$1.50	1	1.50		Estimated Sales After Price Change	$778.97
	Toast	$1.40	Coffee	$1.50	1	1.50			
	Bread	$0.95	Coffee	$1.50	0	0.00			
	Alfajores	$2.95	Fudge	$2.79	1	2.79			
	Bread	$0.95	Coffee	$1.50	1	1.50			

4.3 perform a t-tests to compare the three conditins.



=T.TEST(B3:B, F3:F, 2, 2)

	A	B	C	D	E	F	G	H	I	J
1	**2/13-2/19**		**2/20-2/28**		**2/20-2/28**			Sales Before Price Change	$1,011.15	
2	**Item**	**Price**	**Item**	**Price**	**New Quantity**	**New Price**		Sales After Price Change	$812.53	
3	Coffee	$1.25	Brownie	$2.93	1	2.93		Est. Sales After Price Change	$778.97	
4	Coffee	$1.25	Coffee	$1.50	1	1.50				
5	Toast	$1.40	Coffee	$1.50	1	1.50		Before vs. After	0.00042934722	
6	Bread	$0.95	Coffee	$1.50	0	0.00		After vs. Estimated	0.4700681582	
7	Alfajores	$2.95	Fudge	$2.79	1	2.79		Before vs. Estimated	0.00168658358	
8	Bread	$0.95	Coffee	$1.50	1	1.50				