FIT5186 Intelligent Systems

Tutorial

Introduction: Basic Excel

Task: Working with Microsoft Excel

- Download the file: **Tutorial 1.xls** from the unit Blackboard site onto your disk and open the workbook
- This workbook contains 7 worksheets: Motorcycle, Addresses, DataTable, Nyse, Sales, Postage and Ski
- If you are not familiar with Excel, read through notes on Excel functions provided **BEFORE** attempting the 7 exercises OTHERWISE go directly to **page 4** to start the exercises

Excel Functions:

1. Relative, absolute and mixed addressing/referencing

The parts of a cell reference which are to be absolute (unchanging) are prefixed by a $ sign. The following table provides examples of the different types of referencing:

Type	Cell Reference	Meaning
Relative	A10	When copied to another row and column, both the row and column in the cell reference are adjusted to reflect the new location.
Absolute	A10	Both column and row references remain the same when you copy this cell reference
Mixed	A$10	The column reference changes when you copy this cell reference to another column because it is relative. The row reference does not change because it is absolute.
Mixed	$A10	The row reference changes when you copy this cell reference to another row because it is relative. The column reference does not change because it is absolute.

2. MAX, MIN, SUM and AVERAGE Functions

In a set of values, MAX function returns the largest value while MIN function returns the smallest value. SUM function adds all the numbers in that set while AVERAGE function averages all the number in that set.

Syntax:	Example: Suppose A1:A5 contain 50, 20, 30, 40, 10
MAX(set of values)	MAX(A1:A5) equals 50
MIN(set of values)	MIN(A1:A5) equals 10
SUM(set of values)	SUM(A1:A5) equals 150
AVERAGE(set of values)	AVERAGE(A1:A5) equals 30

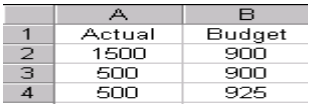
3. IF, VLOOKUP, ISNA , COUNTIF and MATCH Functions

IF function returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE.

Syntax:

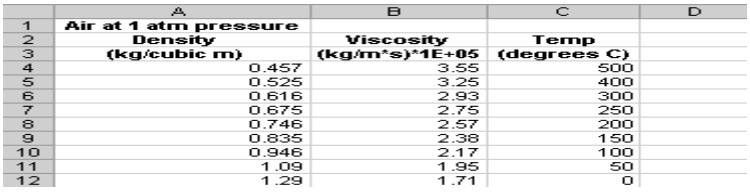
IF(*logical_test, value_if_true, value_if_false*)

Logical_test	A logical expression (condition) as either True or False
Value_if_true	The value returned if the logical test is True
Value_if_false	The value returned if the logical test is False

Examples	
	
	IF(A2>B2, “Over Budget”, “OK”) equals “Over Budget”
	IF(A3>B3, “Over Budget”, “OK”) equals “OK”

VLOOKUP function searches for a value in the leftmost column of a table and returns a value in the same row from a column you specify in the table. If a value cannot be found, an error value #N/A (value not available) is returned.

Syntax: ***VLOOKUP(lookup_value, table_array, col_index_num, range_lookup)***

Lookup_value	Value to be found in the first column of table_array It can be a value, a reference or a text string
Table_array	Table of information in which data is looked up
Col_index_num	Column number in table_array from which the matching value must be returned
Range_lookup	Logical value that specifies whether you want VLOOKUP to find an exact match or an approximate match If **TRUE** or **omitted**, an approximate matched is returned If **FALSE**, VLOOKUP will find an exact match If not found, an error value #N/A (value not available) is returned
Examples	 VLOOKUP(1, A4:C12, 1, True) equals 0.946 VLOOKUP(1, A4:C12, 2) equals 2.17 VLOOKUP(1, A4:C12, 3, True) equals 100 VLOOKUP(0.746, A4:C12, 3, False) equals 200 VLOOKUP(0.1, A4:C12, 2, False) equals #N/A error because 0.1 does not appear in left most column of the table_array

	A	B	C	D
1	**Air at 1 atm pressure**			
2	**Density**	**Viscosity**	**Temp**	
3	**(kg/cubic m)**	**(kg/m*s)*1E+05**	**(degrees C)**	
4	0.457	3.55	500	
5	0.525	3.25	400	
6	0.616	2.93	300	
7	0.675	2.75	250	
8	0.746	2.57	200	
9	0.835	2.38	150	
10	0.946	2.17	100	
11	1.09	1.95	50	
12	1.29	1.71	0	

ISNA function returns the logical value TRUE if value is #N/A (value not available), otherwise it returns FALSE.

Syntax: ***ISNA(value)***

Example:

Suppose A2 contains a VLOOKUP function and the value returned by the VLOOKUP function is #N/A error
ISNA(A2) equals TRUE

COUNTIF function counts the number of cells within a range that meet the given criteria.

Syntax: ***COUNTIF(range, criteria)***

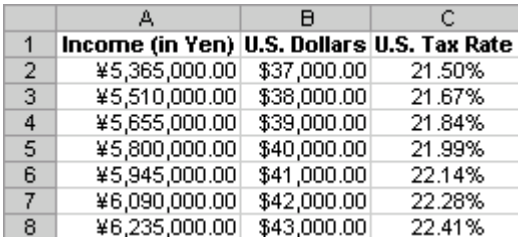
Range	Range of cells from which you want to count cells
Criteria	Criteria in the form of a number, expression, or text that defines which cells will be counted
Example	Suppose A1:A5 contain 15, 10, 20, 40, 40 COUNTIF(A1:A5,"=40") equals 2

MATCH function returns the relative position of an item in an array that matches a specified value in a specified order. Use MATCH instead of VLOOKUP functions when you need the position of an item in a range instead of the item itself. If a value cannot be found, an error value #N/A (value not available) is returned.

Syntax:

MATCH(lookup_value, lookup_array, match_type)

Lookup_value	Value to be matched in lookup_array It can be a value, a cell reference
Lookup _array	Column or row containing the values
Match_type	Number –1, 0 or 1 Specifies how Excel matches lookup_value with values in lookup_array If match_type is **1** or **omitted**, MATCH finds the largest value that is <= lookup_value. Lookup_array must be in ascending order If match_type is **0**, MATCH finds the first value that is exactly equal to lookup_value. Lookup_array can be in any order If match_type is **–1**, MATCH finds the smallest value that is >= lookup_value. Lookup_array must be placed in descending order If not found, an error value #N/A (value not available) is returned.

Examples	
	
	MATCH(39000, B2:B8, 1) equals 3
	MATCH(38000, B2:B8, 0) equals 2
	MATCH(40500, B2:B8, 0) equals #N/A error because 40500 cannot be found the range B2:B8
	MATCH(39000, B2:B8, -1) equals #N/A error because the range B2:B8 is ordered incorrectly for match type –1 (order must be descending)

	A	B	C
1	**Income (in Yen)**	**U.S. Dollars**	**U.S. Tax Rate**
2	¥5,365,000.00	$37,000.00	21.50%
3	¥5,510,000.00	$38,000.00	21.67%
4	¥5,655,000.00	$39,000.00	21.84%
5	¥5,800,000.00	$40,000.00	21.99%
6	¥5,945,000.00	$41,000.00	22.14%
7	¥6,090,000.00	$42,000.00	22.28%
8	¥6,235,000.00	$43,000.00	22.41%

Exercise 1: Motorcycle Worksheet

	A	B	C	D	E
1	Motorcycle Specialities Incoporated				
2	Sales Comparison 2001 with 2000				
3					
4	**Region**	**Year2001**	**Year 2000**	**% Change Sales**	**% of 2001 Sales**
5	North America	$ 365,000.00	$ 314,330.00	16.12%	28.50%
6	South America	$ 354,250.00	$ 292,120.00	21.27%	27.66%
7	Australia	$ 251,140.00	$ 262,000.00	-4.15%	19.61%
8	Europe	$ 310,440.00	$ 279,996.00	10.87%	24.24%
9	**Total**	$1,280,830.00	$1,148,446.00		
10	**Maximum**	$ 365,000.00			
11	**Minimum**	$ 251,140.00			

i) Enter a formula in cell D5 such that it can be copied to cells D6:D8.
% Change in Sales for North America is calculated using this formula:
(2001 sales in North America – 2000 sales in North America)/2000 sales in North America

ii) Calculate the total sales in 2001 and 2000 in cell B9 and C9 respectively

iii) Enter a formula in cell E5 such that it can copied be to cells E6:E8
The formula used to calculate North America's % of total 2001 sales is:
2001 sales in North America/Total sales in 2001

iv) Use an Excel function to find the highest sales in 2001 in cell B10

v) Use an Excel function to find the lowest sales in 2001 in cell B11

Exercise 2: Address Worksheet

	A	B	C	D	E	F	G	H	I	J
1	Fresh Air Sales Representative Incentive Program									
2										
3		Sales Goal (% Increase)	10%							
4										
5			2000	2001						
6				1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total 2001	2001	% Goal
7	**Territory**	**Name**	**Sales**	**Actual**	**Actual**	**Actual**	**Actual**	**Actual**	**Goal**	**Reached**
8	Central	Oliver, Deby	$182,018.00	$ 66,897.00	$ 56,874.00	$ 66,345.00	$ 93,234.00	$283,350.00	$200,219.80	142%
9	Central	Richstone, Ellen	$176,900.00	$ 43,658.00	$ 65,223.00	$ 59,087.00	$ 38,900.00	$206,868.00	$194,590.00	106%
10	Central	Azevedo, Tricia	$179,385.00	$ 53,278.00	$ 47,895.00	$ 53,334.00	$ 43,445.00	$197,952.00	$197,323.50	100%
11	Eastern	Gyorog, Mike	$211,408.00	$ 55,789.00	$ 65,996.00	$ 69,023.00	$ 42,215.00	$233,023.00	$232,548.80	100%
12	Eastern	Haag, Candee	$156,877.00	$ 31,566.00	$ 43,677.00	$ 48,043.50	$ 41,566.00	$164,852.50	$172,564.70	96%
13	Eastern	Sako, Mari	$176,504.00	$ 36,221.50	$ 45,987.00	$ 46,033.80	$ 33,546.00	$161,788.30	$194,154.40	83%
14	Southern	Hess, Lisa	$212,550.00	$ 32,778.00	$ 65,996.00	$ 42,334.00	$ 37,650.00	$178,758.00	$233,805.00	76%
15	Southern	Wertheim, Andrea	$193,250.00	$ 42,666.00	$ 35,874.00	$ 34,788.00	$ 47,888.00	$161,216.00	$212,575.00	76%
16	Western	Massalska, Angela	$172,894.00	$ 35,998.00	$ 41,566.00	$ 44,366.00	$ 38,071.10	$160,001.10	$190,183.40	84%
17	Western	Widnall, Sheila	$172,369.00	$ 31,567.00	$ 45,987.00	$ 44,024.10	$ 33,156.00	$154,734.10	$189,605.90	82%
18	Western	Lahiri, Nayanjot	$238,605.00	$ 61,233.00	$ 72,344.00	$ 41,277.00	$ 32,172.20	$207,026.20	$262,465.50	79%

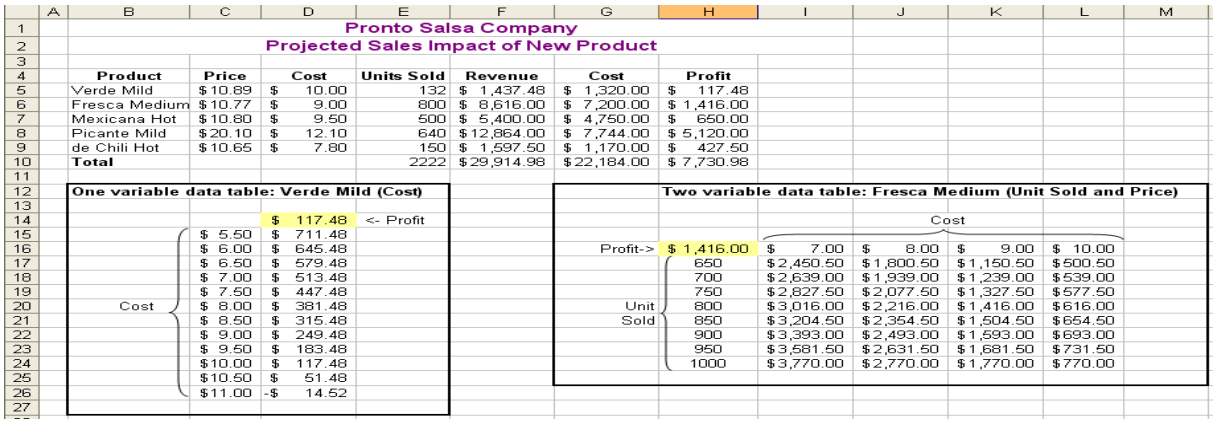
i) This worksheet is used to keep track the results of the sales incentive program of all sales representatives in Fresh Air Ltd. Each sales representative has been assigned a sales goal 10% higher than his or her total sales last year.

ii) Enter a formula in cell H8 to calculate the total 2001 actual sales for each sales representative such that it can be copied to cells H9:H18.

iii) Enter a formula in cell I8 such that it can be copied to cells I9:I18
The formula used to calculate the 2001 Goal sales for each employee is:
2000 Sales * (1 + Sales Goal % increase)

iv) Enter a formula in cell J8 to calculate of the % goal reached for each employee such that it can be copied to cells J9:J18.
The formula used to calculate this is:
2001 actual / 2001 goal

Exercise 3: DataTable Worksheet



Pronto Salsa Company
Projected Sales Impact of New Product

Product	Price	Cost	Units Sold	Revenue	Cost	Profit
Verde Mild	$10.89	$ 10.00	132	$ 1,437.48	$ 1,320.00	$ 117.48
Fresca Medium	$10.77	$ 9.00	800	$ 8,616.00	$ 7,200.00	$ 1,416.00
Mexicana Hot	$10.80	$ 9.50	500	$ 5,400.00	$ 4,750.00	$ 650.00
Picante Mild	$20.10	$ 12.10	640	$12,864.00	$ 7,744.00	$ 5,120.00
de Chili Hot	$10.65	$ 7.80	150	$ 1,597.50	$ 1,170.00	$ 427.50
Total			2222	$29,914.98	$22,184.00	$ 7,730.98

One variable data table: Verde Mild (Cost)

	$ 117.48	<- Profit
$ 5.50	$ 711.48	
$ 6.00	$ 645.48	
$ 6.50	$ 579.48	
$ 7.00	$ 513.48	
$ 7.50	$ 447.48	
Cost $ 8.00	$ 381.48	
$ 8.50	$ 315.48	
$ 9.00	$ 249.48	
$ 9.50	$ 183.48	
$10.00	$ 117.48	
$10.50	$ 51.48	
$11.00	-$ 14.52	

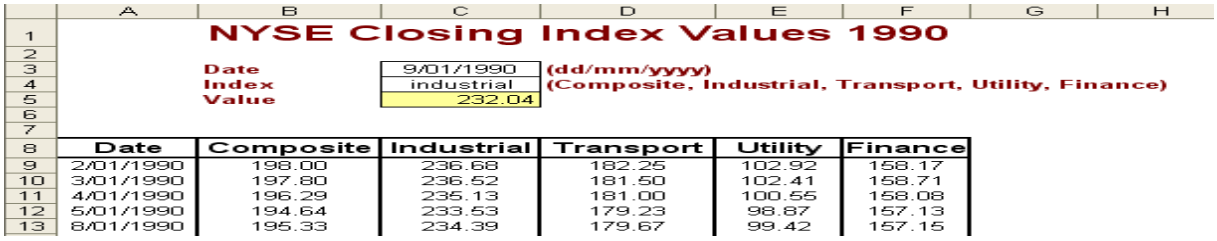
Two variable data table: Fresca Medium (Unit Sold and Price)

		Cost $ 7.00	$ 8.00	$ 9.00	$ 10.00
Profit->	$ 1,416.00				
Unit Sold	650	$2,450.50	$1,800.50	$1,150.50	$500.50
	700	$2,639.00	$1,939.00	$1,239.00	$539.00
	750	$2,827.50	$2,077.50	$1,327.50	$577.50
	800	$3,016.00	$2,216.00	$1,416.00	$616.00
	850	$3,204.50	$2,354.50	$1,504.50	$654.50
	900	$3,393.00	$2,493.00	$1,593.00	$693.00
	950	$3,581.50	$2,631.50	$1,681.50	$731.50
	1000	$3,770.00	$2,770.00	$1,770.00	$770.00

i) Create a one-variable data table (Data>Table) showing the profit of Verde Mild under the assumption that the price of each Verde Mild is $10.89 and that the cost of each Verde Mild is $5.50 to $11.00 (in increment of $0.50).

ii) Create a two-variable data table showing the profit of Fresca Medium assuming that 650 to 1000 (in increment of 50) units are sold and that the cost per Fresca Medium is $7.00, $8,00, $9.00 and $10.00.

Exercise 4: Nyse worksheet



NYSE Closing Index Values 1990

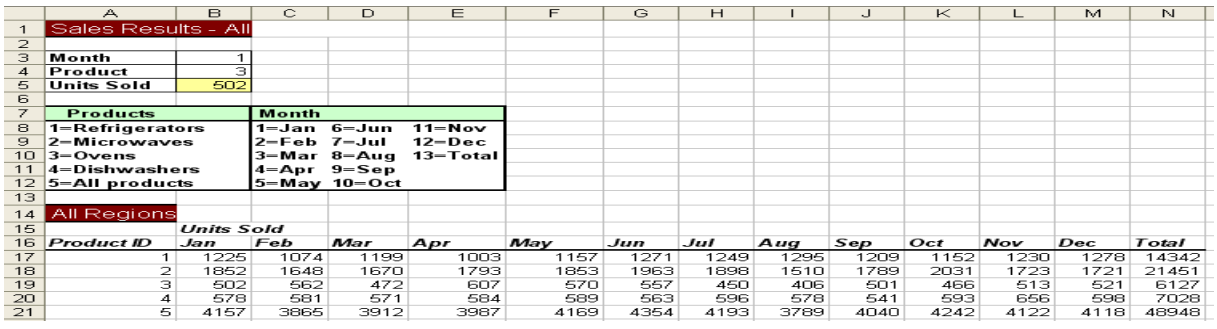
Date: 9/01/1990 (dd/mm/yyyy)
Index: industrial (Composite, Industrial, Transport, Utility, Finance)
Value: 232.04

Date	Composite	Industrial	Transport	Utility	Finance
2/01/1990	198.00	236.68	182.25	102.92	158.17
3/01/1990	197.80	236.52	181.50	102.41	158.71
4/01/1990	196.29	235.13	181.00	100.55	158.08
5/01/1990	194.64	233.53	179.23	98.87	157.13
8/01/1990	195.33	234.39	179.67	99.42	157.15

i) This worksheet contains the daily closing stock indices for four subgroups (Industrial, Transportation, Utility and Finance) and a Composite index combining the values of the other four on the New York Stock Exchange (NYSE).

ii) Enter a formula in cell C5 such that the closing value will be displayed based on the date (in cell C3) and subgroup (in cell C4) entered by user.
(*Hint:* Use the MATCH function to replace the col_index_num parameter in the VLOOKUP function. In this way, instead of having the user indicate the column number from the lookup table, the user can enter the column title (subgroup name) and have MATCH function return the column number)

Exercise 5: Sales Worksheet



Sales Results - All

Month	1
Product	3
Units Sold	502

Products	Month		
1=Refrigerators	1=Jan	6=Jun	11=Nov
2=Microwaves	2=Feb	7=Jul	12=Dec
3=Ovens	3=Mar	8=Aug	13=Total
4=Dishwashers	4=Apr	9=Sep	
5=All products	5=May	10=Oct	

All Regions

	Units Sold												
Product ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1	1225	1074	1199	1003	1157	1271	1249	1295	1209	1152	1230	1278	14342
2	1852	1648	1670	1793	1853	1963	1898	1510	1789	2031	1723	1721	21451
3	502	562	472	607	570	557	450	406	501	466	513	521	6127
4	578	581	571	584	589	563	596	578	541	593	656	598	7028
5	4157	3865	3912	3987	4169	4354	4193	3789	4040	4242	4122	4118	48948

i) Enter a formula in cell B5 to extract the total unit sold based on the month number (in cell B3) and product id (in cell B4) entered by the user.

Exercise 6: Postage Worksheet

	A	B	C	D	E	F
1	**Price Table:**					
2	**WEIGHT**	**MAIL**	**COURIER**	**TRUCK**	**BEST COST**	**BEST MODE**
3	**0**	3.00	9.25	6.50	3.00	Mail
4	**2**	3.50	9.25	6.50	3.50	Mail
5	**7**	5.25	9.25	10.00	5.25	Mail
6	**20**	10.00	9.25	12.00	9.25	Courier
7	**45**	16.00	NA	14.00	14.00	Truck
8	**100**	35.00	NA	15.50	15.50	Truck
9						
10	**Customer queries: vlookup**					
11	**WEIGHT**	**MAIL**	**BEST COST**	**BEST MODE**		
12	13.7	5.25	5.25	Mail		
13	1.6	3	3	Mail		
14	185	35	15.5	Truck		
15						
16						
17	**Customer queries: vlookup & if functions**					
18	**WEIGHT**	**MAIL**	**BEST COST**	**BEST MODE**		
19	13.7	5.25	5.25	Mail		
20	1.6	3	3	Mail		
21	185	35	15.5	Truck		

i) The Price table contains cost of postage by mail, courier and truck for the appropriate weight, and also for each weight range, the best cost and best mode to take.

ii) For each package (cells: A13, A14 and A15), use VLOOKUP function to
- determine the cost to send the package by courier
- determine the lowest cost to send the package
- determine the lowest cost mode to the package

iii) In cells B19:D21, use VLOOKUP function but replace the col_index_num parameter with the nested IF function

Exercise 7: Ski Worksheet

	A	B	C	D	E	F	G
1	**Member List**				**Competition Results**		
2	MemberID	Name	Ski Attendance		MemberID	Name	Ski Runs
3							
4	1010	Joseph	Present		1005	Jennifer	68
5	1009	Mary	Present		1001	Stephanie	43
6	1008	Emily	Present		1003	Samantha	90
7	1007	Peter	Present		1010	Joseph	65
8	1006	Eric	Absent		1009	Mary	54
9	1005	Jennifer	Present		1007	Peter	44
10	1004	Stuart	Absent		1008	Emily	98
11	1003	Samantha	Present				
12	1002	Anthony	Absent				
13	1001	Stephanie	Present				
14	1000	Conrad	Absent				
15							
16	Number of Absentees:	4					
17							
18	Average Ski Runs	66					

i) F4 should contain a formula, which provides the name of the member corresponding to the MemberID in cell E4. The formula should be written in such a way that it is easily copied to cells F5:FF10 (*Hint:* Use VLOOKUP function)

ii) C4 should contain a formula, which enters the word “present” in cell C4 if the member in A4 attended the competition, and “absent” if the member did not attend the competition. The formula should be written in such a way that it is easily copied to C5:C14
(*Hint:* Use a combination of IF, ISNA and MATCH functions)

iii) B16 should give the total number of skiers absent from the competition
(*Hint:* Use COUNTIF function)

iv) B18 should give the average number of ski runs