

Business Analytics (Evans)
Chapter 2 Analytics on Spreadsheets

1) Which of the following symbols is used to represent exponents in Excel?

- A) ^
- B) *
- C) #
- D) !

Answer: A

Diff: 1

Blooms: Remember

Topic: Basic Excel Skills

LO1: Find buttons and menus in the Excel 2010 ribbon.

LO2: Use a modern software tool to perform statistical calculations.

2) Which of the following ways would $10^2 \times 5^3 / 100 - 73$ be represented in an Excel spreadsheet?

- A) 10(2) * 5(3) / 100 ^ 73
- B) 10(2) ^ 5(3) / 100 - 73
- C) 10^2 * 5^3 / 100 - 73
- D) 10*2 ^ 5*3 / 100 - 73

Answer: C

Diff: 1

Blooms: Understand

Topic: Basic Excel Skills

LO1: Write correct formulas in an Excel worksheet.

LO2: Use a modern software tool to perform statistical calculations.

3) Which of the following is a difference between relative addressing and absolute addressing when using cell formulas in Excel?

- A) A relative address uses a dollar sign before either the row or column label; an absolute address uses the ampersand symbol before either the row or column label.
- B) A relative address uses a dollar sign before either the row or column label; an absolute address uses just the row and column label in the cell reference.
- C) A relative address uses just the row and column label in the cell reference; an absolute address uses a dollar sign before either the row or column label.
- D) A relative address uses only the column label in the cell reference; an absolute address uses the row.

Answer: C

Diff: 2

Blooms: Remember

Topic: Basic Excel Skills

LO1: Apply relative and absolute addressing in Excel formulas.

LO2: Use a modern software tool to perform statistical calculations.

Use the data given below to answer the following question(s)

Below is the spreadsheet for demand prediction of a company that sells chocolates.

	A	B	C
1	Demand Prediction Models		
2			
3	Linear Model		
4	A	10,000	
5	B	10	
6			
7	Price	Demand	
8	\$50	9,500	
9	\$55	9,450	
10	\$45	9,550	
11			

4) Given that $D = a - bP$, where D , is demand, "a" and "b," are linear constants, and P , is price, from the below spreadsheet, how will the formula in B9 be represented in Excel using relative addressing?

- A) $B4 - B5 * A9$
- B) $C5 - C6 * A10$
- C) $B4 - B5 * A10$
- D) $B5 - B6 * A10$

Answer: A

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Basic Excel Skills

LO1: Copy formulas from one cell to another or to a range of cells.

LO2: Use a modern software tool to perform statistical calculations.

5) If a dollar sign is used after the column in B5 (B\$5), how will the formula at B8 be represented in C9 using absolute addressing?

- A) $C3 - B\$5 * C9$
- B) $C5 - C\$6 * B9$
- C) $C5 - C\$6 * C9$
- D) $C5 - C\$5 * B9$

Answer: D

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Basic Excel Skills

LO1: Apply relative and absolute addressing in Excel formulas.

LO2: Use a modern software tool to perform statistical calculations.

6) If a dollar sign is used before the column label B4 (\$B4), how will the formula at B10 be represented in C11 using absolute addressing?

- A) \$B5-C6*B11
- B) \$C5-C6*A10
- C) \$B4-C5*B11
- D) \$A5-C6*B11

Answer: A

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Basic Excel Skills

LO1: Apply relative and absolute addressing in Excel formulas.

LO2: Use a modern software tool to perform statistical calculations.

7) If, in the spreadsheet, cells B9 and B10 were empty, which of the following formulas should be entered in B8 so that the formula can be dragged to B9 and B10 to obtain their correct values?

- A) B4-B5*A8
- B) B4-B5*\$A8
- C) \$B4-B5*\$A8
- D) \$B\$4-\$B\$5*\$A8

Answer: D

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Basic Excel Skills

LO1: Copy formulas from one cell to another or to a range of cells.

LO2: Use a modern software tool to perform statistical calculations.

8) Using a \$ sign before a column label _____.

- A) keeps the reference to both the row and column fixed
- B) keeps the reference to the row fixed, but allows the column reference to change
- C) keeps the reference to column fixed, but allows the row reference to change
- D) allows both the row and column references to change

Answer: C

Diff: 1

Blooms: Remember

AACSB: Analytic Skills

Topic: Basic Excel Skills

LO1: Copy formulas from one cell to another or to a range of cells.

LO2: Use a modern software tool to perform statistical calculations.

9) To copy a formula from a single cell or range of cells down a column or across a row, first _____, click and hold the mouse on the small square in the lower right-hand corner of the cell, and drag the formula to the "target" cells which you wish to copy.

- A) press Ctrl-C
- B) select the cell or range
- C) press Ctrl-Enter
- D) select the whole spreadsheet

Answer: B

Diff: 1

Blooms: Remember

AACSB: Analytic Skills

Topic: Basic Excel Skills

LO1: Copy formulas from one cell to another or to a range of cells.

LO2: Use a modern software tool to perform statistical calculations.

10) Trace the process of copying and pasting a cell, which has a formula in it, such that the formula is not retained in the pasted cell.

- A) Home - Paste - Paste Special - Paste Values
- B) Home - Paste - Paste Special - Paste Validation
- C) Home - Paste - Paste Special - Paste Formats
- D) Home - Paste - Paste Special - Paste Formulas

Answer: A

Diff: 1

Blooms: Remember

Topic: Basic Excel Skills

LO1: Copy formulas from one cell to another or to a range of cells.

LO2: Use a modern software tool to perform statistical calculations.

11) Which of the following is a differentiation between calculating using the functions COUNT and COUNTIF?

- A) COUNT does not require a range of cells; COUNTIF requires a range of cells.
- B) COUNT only requires a range of cell and can be obtained without a special criteria, COUNTIF requires range and special criteria to be calculated.
- C) COUNT requires a range of cells; COUNTIF does not require a range of cells, only special criteria.
- D) COUNT calculates the sum of values for a range of cells; COUNTIF finds the largest value in a range of cells.

Answer: B

Diff: 2

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

12) The Excel function of _____ is used to find the largest value in a range of cells.

- A) SUM(range)
- B) COUNT(range)
- C) MAX(range)
- D) COUNTIF(range, criteria)

Answer: C

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

Use the data given below to answer the following question(s).

Below is a spreadsheet of purchase orders for a computer hardware retailer.

	A	B	C	D	E	F	G	H
1	Purchase Orders							
2								
3	Supplier	Item Description	Item Cost	Quantity	Cost per Order	A/P Terms (Months)	Order No.	Order Size
4	Rex Technologies	Graphics Card	\$ 89	35	\$3115	20	AL123	Large
5	Rex Technologies	Monitor	\$150	15	\$2250	25	AL234	Small
6	Rex Technologies	Keyboard	\$ 15	40	\$600	15	AL345	Large
7	Rex Technologies	Speakers	\$ 15	20	\$300	25	AL456	Small
8	Max's Wavetech	HD Cables	\$ 5	10	\$50	25	KO876	Small
9	Max's Wavetech	Processor	\$278	27	\$6950	30	KO765	Large
10	Max's Wavetech	Hard disk	\$120	18	\$2160	20	KO654	Small
11								
12								

13) To find the largest quantity of items ordered from Rex Technologies, what Excel formula should be used in A12?

- A) =COUNTIF(D4:D10)
- B) =SUM(D4:D7)
- C) =MAX(D4:D7)
- D) =COUNT(D4:D7)

Answer: C

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

14) To find the total order cost, what Excel formula should be used in A12?

A) =COUNT(C4:C10)

B) =COUNT(C4:C7)

C) =MAX(C4:C10)

D) =SUM(E4:E10)

Answer: D

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

15) For which of the following columns can the COUNT function be performed?

A) column G

B) column E

C) column B

D) column A

Answer: B

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

16) To find the average of the total cost of orders from Rex Technologies, what Excel formula should be used in A12?

A) =AVERAGE(C4:C10)

B) =AVERAGE(C4:C7)

C) =AVERAGE(E4:E7)

D) =AVERAGE(E4:E10)

Answer: C

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

17) To find the number of orders with A/P terms less than 25 months, what Excel formula should be used in A12?

- A) =COUNTIF(F4:F10,"<25")
- B) =COUNT(F4:F10,25)
- C) =AVERAGE(F4:F10,"<25")
- D) =COUNTIF(F4:F10,F5)

Answer: A

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

18) If purchase quantities of 25 units or higher are found to be large orders, and orders less than 25 are considered to be small, what IF function should be entered in H4 to be copied to H5:H10 to calculate each order's size?

- A) =IF(D4=AND=OR=25,"Large","Small")
- B) =IF(D4<>25,"Small")=AND(D4=25,"Large")
- C) =IF(D4=25,"Large")=OR("Small")
- D) =IF(D4>=25,"Large","Small")

Answer: D

Diff: 2

Blooms: Apply

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

19) _____ measures the worth of a stream of cash flows, taking into account the time value of money.

- A) Accounting rate of return
- B) Net present value
- C) Internal rate of return
- D) Adjusted present value

Answer: B

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

20) The _____ reflects the opportunity costs of spending funds now versus achieving a return through another investment, as well as the risks associated with not receiving returns until a later time.

- A) modified internal rate of return
- B) payback period
- C) accounting rate of return
- D) discount rate

Answer: D

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

21) Identify the equation for calculating the net present value for a stated period of time, where F_t = cash flow in period t , and i is the discount rate.

$$A) NPV = \sqrt{\frac{\sum_{t=0}^n \left| \frac{F_t + i}{2} \right|}{n}}$$

$$B) NPV = \sum_{t=0}^n F_t (1 + i)^t$$

$$C) NPV = \sum_{t=0}^n \frac{F_t}{(1 + i)^t}$$

$$D) NPV = \sum_{t=0}^n \frac{F_t}{i} \sqrt{(1 + i)^t}$$

Answer: C

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

22) A positive NPV means that the investment will provide added value because the projected return exceeds the _____.

- A) modified internal rate of return
- B) discount rate
- C) accounting rate of return
- D) adjusted present value

Answer: B

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

23) The easiest way to locate a particular function is to select a cell and click on the Insert function button represented by _____ on the Excel ribbon.

- A) f_x
- B) Σ
- C) \$
- D) %

Answer: A

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Find buttons and menus in the Excel 2010 ribbon.

LO2: Use a modern software tool to perform statistical calculations.

24) _____ is a logical function that returns one value if the condition is true and another if the condition is false.

- A) OR(*condition 1, condition 2...*)
- B) AND(*condition 1, condition 2...*)
- C) TO(*value if true, value if false*)
- D) IF(*condition, value if true, value if false*)

Answer: D

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

25) Which of the following functions is a logical function that returns TRUE if any condition is true and FALSE if not?

- A) TO(*value if true, value if false*)
- B) AND(*condition 1, condition 2...*)
- C) OR(*condition 1, condition 2...*)
- D) IF(*condition, value if true, value if false*)

Answer: C

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

26) Give the logical function for the following: If cell B7 equals 12, check contents of cell B10. If cell B10 is 10, then the value of the function in the string is YES; if not, it is a blank space. If cell B7 does not equal 12, then the value of the function is 7.

- A) =IF(B7=12,(AND(B10=10, ""))(YES)),7)
- B) =IF(B10=10,(OR(B7=12, ""))"YES")7)
- C) =IF(B7=12,(IF(B10=10,"YES", "")),7)
- D) =IF(B7=12,(AND(B10=10,"YES", ""))(B10="NO"),7)

Answer: C

Diff: 3

Blooms: Understand

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

27) If cell G7 contains the function _____, it states that if the value in cell C3 is 9, the number 7 will be assigned to cell G7; if the value in cell C3 is not 9, the number 4 will be assigned to cell G7.

- A) =IF(G7=9)(G7=7)=OR(G7=4)
- B) =IF(G7=7)=THEN(C3=9)=OR(C3=4)
- C) =IF(C3=9)(C3=7)=OR(C3=4)
- D) =IF(C3=9,7,4)

Answer: D

Diff: 2

Blooms: Understand

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

28) The function _____ returns a value or reference of the cell at the intersection of a particular row and column in a given range.

- A) VLOOKUP(*lookup_value, table_array, col_index_num*)
- B) INDEX(*array, row_num, col_num*)
- C) MATCH(*lookup_value, lookup_array, match_type*)
- D) HLOOKUP(*lookup_value, table_array, row_index_num*)

Answer: B

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

29) Which of the following Lookup functions returns the relative position of an item in an array that equals a specified value in a specified order?

- A) HLOOKUP(*lookup_value*, *table_array*, *row_index_num*)
- B) MATCH(*lookup_value*, *lookup_array*, *match_type*)
- C) INDEX(*array*, *row_num*, *col_num*)
- D) VLOOKUP(*lookup_value*, *table_array*, *col_index_num*)

Answer: B

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

30) In a MATCH function, if the *match_type* = 0, then _____.

- A) the function finds the largest value that is less than or equal to *lookup_value*
- B) the function finds the smallest value that is greater than or equal to *lookup_value*
- C) MATCH finds the first value that is exactly equal to *lookup_value*
- D) the values in the *lookup_array* must be in a particular order

Answer: C

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

31) For which of the following MATCH functions must the values in the *lookup_array* be ordered in a descending order?

- A) When *match_type* = -1
- B) When *match_type* > 1
- C) When *match_type* = 0
- D) When *match_type* = 1

Answer: A

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

Use the following scenario to answer the following question(s)

The Blue Sunset Band is planning to record a new album. A major decision to be made is if the band can record the album on their own, or if they should hire a studio to record it with. The fixed cost for recording at the studio is \$100,000 plus the manufacturing cost per CD, which is at \$250. If they record the album in-house, the cost per CD is \$350. They plan to produce 3000 copies of the album regardless of the place of recording. The band plans to record with the cheaper option. Below is the spreadsheet of the Recording Decision.

	A	B
1	The Blue Sunset Band Album Recording Decision	
2		
3	Data	
4		
5	Recording at Studio	
6	Fixed Cost	\$ 100,000
7	Unit CD Cost	\$ 250
8		
9	Recording In-house	
10	Unit CD Cost	\$ 350
11		
12	Production Volume	3000
13		
14	Model	
15		
16	Total studio manufacturing cost	\$ 850,000
17	Total in-house manufacturing cost	\$1,050,000
18		
19	Cost Difference	-\$ 200,000
20	Recording Decision	Studio

32) Using the spreadsheet below, provide the steps in using Excel formulas in finding the cost of the first order for Item number 1345, and the total cost of all Item numbers 1345, using the Match and Index functions in Excel. Column B is sorted by item number in ascending order.

	A	B	C	D	E
1	Purchase Orders				
2					
3	Supplier	Item No.	Item Cost	Quantity	Cost per Order
4	Rex Technologies	1123	\$ 89	35	\$3115
5	Rex Technologies	1234	\$150	15	\$2250
6	Rex Technologies	1345	\$ 15	40	\$ 600
7	Rex Technologies	1345	\$ 15	20	\$ 300
8	Max's Wavetech	1345	\$ 5	10	\$ 50
9	Max's Wavetech	1765	\$278	27	\$6950
10	Max's Wavetech	1654	\$120	18	\$2160
11	Rex Technologies	1765	\$ 54	56	\$3024
12	Rex Technologies	1100	\$ 71	33	\$2343
13	Rex Technologies	1100	\$ 10	14	\$ 140
14	Rex Technologies	1683	\$ 7	25	\$ 175
15	Max's Wavetech	1683	\$100	31	\$3100

Answer: To find the order cost associated with the first order for 1345, which is in column E, we have to first use the Match function, =MATCH(1345,\$B\$4:\$B\$15,0).

Accordingly, the result will be, =MATCH(1345,\$B\$4:\$B\$15,0) = 3.

In order to find the cost associated with this result, we add this function in an Index function.

Therefore, the formula for finding cost is,

=INDEX(\$A\$4:\$E\$15,MATCH(1345,\$B\$4:\$B\$15,0),5). (1)

The result for this formula is,

=INDEX(\$A\$4:\$E\$15,MATCH(1345,\$B\$4:\$B\$15,5) = \$600.

To find the total cost associated with all items under Item number: 1345, we find the last cost associated with 1345 in column E, which is given by the formula

=INDEX(\$A\$4:\$E\$15,MATCH(1345,\$B\$4:\$B\$15,1),5). (2)

The result for this formula is,

=INDEX(\$A\$4:\$E\$15,MATCH(1345,\$B\$4:\$B\$15,1),5) = \$50.

We then substitute both (1) and (2) into Excel's SUM function.

Therefore we get,

=SUM(INDEX(\$A\$4:\$E\$15,MATCH(1345,\$B\$4:\$B\$15,0),5):INDEX(\$A\$4:\$E\$15,MATCH(1345,\$B\$4:\$B\$15,1),5))

Therefore the total cost for all items under 1345,

=SUM(INDEX(\$A\$4:\$E\$15,MATCH(1345,\$B\$4:\$B\$15,0),5):INDEX(\$A\$4:\$E\$15,MATCH(1345,\$B\$4:\$B\$15,1),5)) = \$950.

Diff: 3

Blooms: Apply

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

33) Using a \$ sign before both the row and column labels keeps the reference to that cell fixed no matter where the formula is copied.

Answer: TRUE

Diff: 1

Blooms: Remember

AACSB: Analytic Skills

Topic: Basic Excel Skills

LO1: Write correct formulas in an Excel worksheet.

LO2: Use a modern software tool to perform statistical calculations.

34) AND(*condition 1, condition 2...*) is a logical function that returns TRUE if all conditions are true and FALSE if not.

Answer: TRUE

Diff: 1

Blooms: Remember

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

35) To use the VLOOKUP(*lookup_value, table_array, col_index_num*), the table must be sorted in descending order.

Answer: FALSE

Diff: 1

Blooms: Remember

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

36) In a MATCH function, the default value for *match_type* = 0.

Answer: FALSE

Diff: 1

Blooms: Remember

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

37) In a MATCH function, if *match_type* = 1, then the function finds the smallest value that is greater than or equal to *lookup_value*.

Answer: FALSE

Diff: 1

Blooms: Remember

AACSB: Analytic Skills

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

38) Describe the method of calculating the net present value (NPV) in Excel.

Answer: The Excel function NPV (*rate*, *value1*, *value2*, ...) calculates the net present value of an investment by using a discount rate and a series of future payments (negative values) and income (positive values). Rate is the rate of discount over the length of one period (*i*), and *value1*, *value2*, ... are 1 to 29 arguments representing the payments and income. The values must be equally spaced in time and are assumed to occur at the end of each period. The NPV investment begins one period before the date of the *value1* cash flow and ends with the last cash flow in the list. The NPV calculation is based on future cash flows. If the first cash flow (such as an initial investment or fixed cost) occurs at the beginning of the first period, then it must be added to the NPV result and not included in the function arguments.

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

39) What is the Insert function in Excel?

Answer: The easiest way to locate a particular function is to select a cell and click on the Insert function button f_x , which can be found under the ribbon next to the formula bar and also in the *Function Library* group in the *Formulas* tab. You may either type in a description in the search field, such as "net present value," or select a category, such as "Financial," from the drop-down box. This feature is particularly useful if you know what function to use but are not sure of what arguments to enter because it will guide you in entering the appropriate data for the function arguments.

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.

40) Explain the different Lookup functions in Excel.

Answer: Excel provides some useful functions for finding specific data in a spreadsheet. These functions are useful in many applications:

$VLOOKUP(lookup_value, table_array, col_index_num)$ looks up a value in the leftmost column of a table and returns a value in the same row from a column you specify. The table must be sorted in an ascending order.

$HLOOKUP(lookup_value, table_array, row_index_num)$ looks up a value in the top row of a table and returns a value in the same column from a row you specify. The table must be sorted in an ascending order from left to right.

$INDEX(array, row_num, col_num)$ Returns a value or reference of the cell at the intersection of a particular row and column in a given range.

$MATCH(lookup_value, lookup_array, match_type)$ Returns the relative position of an item in an array that matches a specified value in a specified order.

Diff: 1

Blooms: Remember

Topic: Excel Functions

LO1: Use basic and advanced Excel functions.

LO2: Use a modern software tool to perform statistical calculations.