GENERAL KNOWLEDGE, SPECIAL TOPICS, & REVIEW

<1>   1 Point – True or False: A 3½-inch diskette is a "hard disk".

FALSE.

<2>   3 Points – Short Answer – Suppose you find an interesting `.EXE` file on the Web, but *you do not know* that it has been infected by the `FROG492.EXE` virus. Can you safely download that file to your hard disk to scan it? Why or why not?

Yes, you can download the file to your disk as long as you don't run it. Once downloaded, you scan it with your virus scanner; if it turns out to be infected you immediately delete the file. Since the program was never executed it never has a chance to infect your system.

<3>   3 Points – Your boss sends you an email with the subject line "I love you" and a `.DOC` file as an attachment. This seems like odd behavior on the part of the boss, so you are suspicious of the attachment. List three ways to verify that the message is legitimate.

1.   Call or email the boss and ask if the message is legitimate!

2.   Surf the Web to see if there are others who have encountered similar messages.

3.   Scan the `.DOC` for viruses; if it comes up dirty then you know it isn't valid.

<4>   3 Points – Short Answer – What is ***comma and quote delimited text*** and what are the advantages of using this particular format for data?

This is a text file containing data where each item is surrounded by double-quotes and separated from the next by commas. Such files are editable by Notepad, easily emailed without requiring attachments, and are readable by most spreadsheet, database, and statistical programs.

<5>   3 Points – Short Answer – I said in class one day something like "A `.WAV` is to a `.BMP` as a `.MP3` is to a `.JPG`" What did I mean by this?

A `.BMP` is an uncompressed image file, but an `.JPG` contains a version of the same image created using a "lossy" compression algorithm. In the same vein a `.WAV` file contains uncompressed audio data, and an `.MP3` contains a version of the same audio created using a lossy compression algorithm. **Both `.WAV` and `.BMP` are uncompressed, both `.MP3` and `.JPG` are compressed using lossy compression techniques.**

<6>   6 Points – Trace the following flowchart and show what the output will be. (The $:=$ sign means "gets the value of".) Use the boxes to keep track of the values of each variable as you trace the flowchart.

```
        ┌─────────┐
        │  START  │
        └────┬────┘
             ▼
        ┌─────────┐
        │  T := 0 │
        └────┬────┘
             ▼
        ┌─────────┐
        │  N := 1 │
        └────┬────┘
             ▼
        ┌──────────────┐
   ┌───►│  T := T + N² │
   │    └──────┬───────┘
   │           ▼
   │    ┌──────────────┐
   │    │  N := N + 1  │
   │    └──────┬───────┘
   │           ▼
YES│        ╱  N <= 5  ╲
   └───────◄           ►
           ╲           ╱
               │ NO
               ▼
        ┌──────────────┐
        │   PRINT  T   │
        └──────┬───────┘
               ▼
        ┌─────────┐
        │  STOP   │
        └─────────┘
```
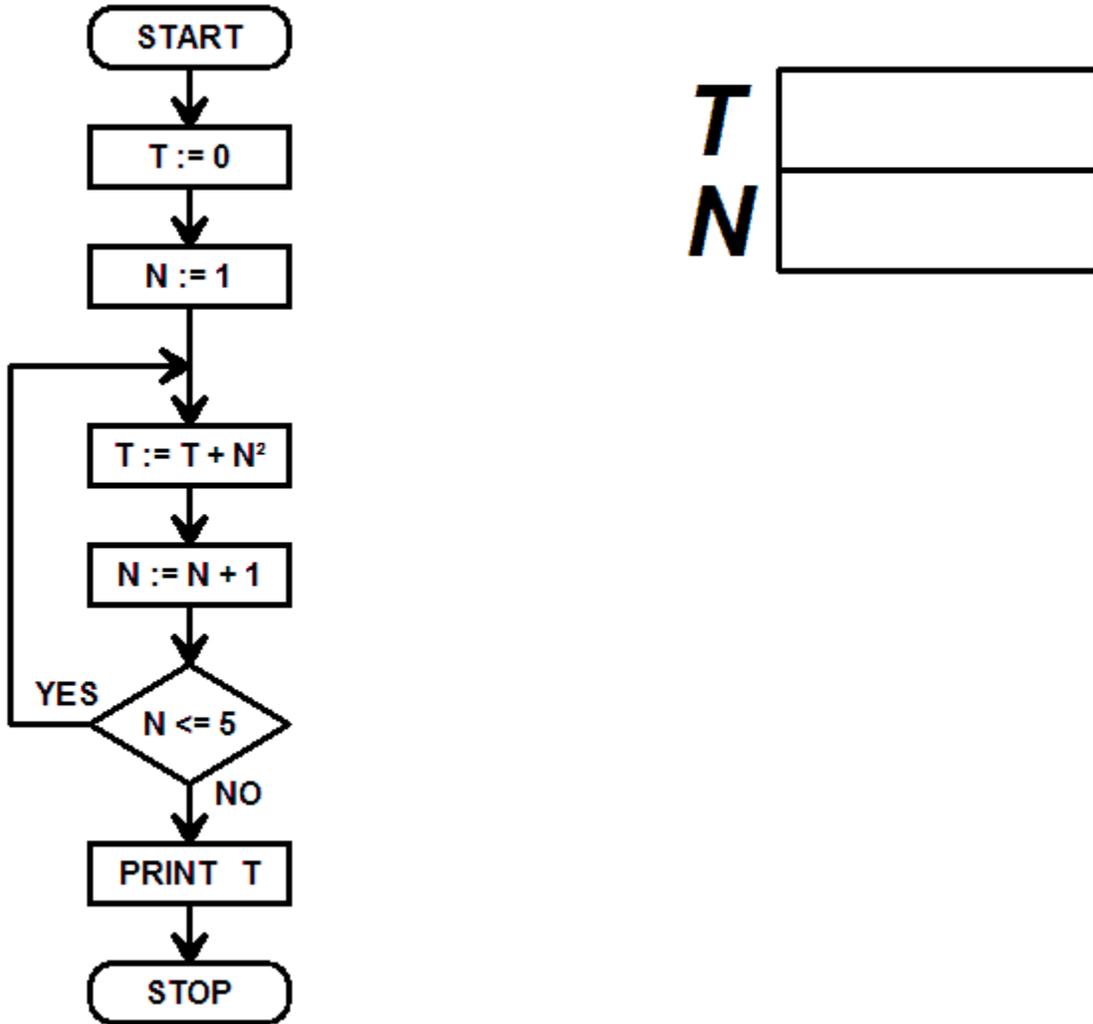
$$T = 1^2 + 2^2 + 3^2 + 4^2 + 5^2 = 1 + 4 + 9 + 16 + 25 = \mathbf{55}.$$

<7>   4 Points – For each of the following independent program changes, determine if the altered program would (a) return the same answer as before, (b) return a different answer, (c) crash, or (d) run forever without stopping?

1.   Replace the **N <= 5** with **N < 5**   **(B) Returns a Different Answer**

2.   Replace the **N := N + 1** with **N := N + 0**   **(D) Runs Forever**

3.   Replace the **N := 1** with **N := 0**   **(B) Returns a Different Answer**

4.   Replace the **N := N + 1** with **N := N − 1**   **(D) Runs Forever or (C) Crashes**

SPREADSHEETS

<8>   5 Points – Cell **V20** contains the formula **=IF(T10<15,MAX($A12:$C15),W22)**, which is then copied to cell **AC18**. What is the resulting formula in cell **AC18** after the copy has been completed?

Partial Credit for:
       =IF(___<15,MAX($A__:$C__),___)

Full Credit for:
       =IF(AA8<15,MAX($A10:$C13),AD20)

Formula is being shifted right by 7 columns (from V to AC) and up by 2 rows (from 20 to 18), so every relative component is shifted by the same amount.
       Cell T10 + <right 7, up 2> = AA8,
       Row 12 + <up 2> = row 10,
       Row 15 + <up 2> = row 13, and
       Cell W22 + <right 7, up 2> = AD20.

<9>   8 Points – Refer to the following spreadsheet model for this set of questions about a video file. You will be writing formulae; **_not_** computing the answers. You may write your answers either in the cells of the sheet shown (write small!) or after each question.

	A	B	C	D
1				
2		200	Width of Video Frame (pixels)	
3		150	Height of Video Frame (pixels)	
4			Pixels per Frame	
5		12	Frames per Second	
6		3	Bytes per Pixel (for color)	
7			Bytes per Second	
8		30	Length of Video (minutes)	
9			Length of Video (seconds)	
10			Total Video Size on Disk (Bytes)	
11				

A.   Write a formula for cell B4 to compute the number of Pixels per frame of video information that must be sent from the hard disk to the display.   **=B2*B3**

B.   Write a formula for cell B7 to compute the total Bytes per Second that must go to the display.   **=B4*B5*B6**

C.   Write a formula for cell B9 to compute the total length of the video in seconds.   **=B8*60**

D.   Write a formula for cell B10 to compute the total file size on disk in bytes.   **=B7*B9**

<10> 4 Points – The cursor is in some cell in the `Output` notebook page (you don't care exactly which cell). Write an Excel formula for the current cell using a single `IF` statement that returns the answer `PASS` if the exam score in cell `A1` of the `Data` notebook page is greater than or equal to 70, and returns the answer `FAIL` otherwise (the exam score is less than 70).

<p style="color:red; text-align:center">=IF(Data!A1>=70,"PASS","FAIL")</p>

<11> 10 Points – Refer to the following spreadsheet model for this set of questions about a small business. You will be writing formulae; <u>***not***</u> computing the answers. You may write your answers either in the cells of the sheet shown or after each question.

	A	B	C	D	E
1					
2		Time In		Time Out	
3		8	Hour	16	
4		12	Minute	58	
5		37	Second	45	
6			Time		
7					
8		Elapsed Time			
9		Total Hours			
10		Hourly Wage	$6.50		
11		Gross Income			
12					

A. Write a **formula** for cell `B6` to compute the time the employee checked in.

<p style="color:red">   =TIME(B3,B4,B5)</p>

B. Write a **formula** for cell `D6` to compute the time the employee checked out.

<p style="color:red">   =TIME(D3,D4,D5)</p>

C. Write a **formula** for cell `C8` to compute the total elapsed time (fraction of a day).

<p style="color:red">   =D6-B6</p>

D. Write a **formula** for cell `C9` to compute the total elapsed time in hours.

<p style="color:red">   =C8*24</p>

E. Write a **formula** for cell `C11` to compute the gross pay for the employee.

<p style="color:red">   =C9*C10</p>

<12> 5 Points – Excel charts. Which chart type (bar, stacked bar, line, pie, HLCO, 3D-bar) would you use for each of the following problems?

A. Monitoring the temperatures at a number of weather stations, plotting a <u>single symbol</u> for each station that summarizes the extremes of the day's temperatures.

HLCO

B. Monitoring the incomes of a number of companies, plotting the <u>percentage of the total</u> taken by each one.

Pie

C. Intentionally obscuring data by hiding small values behind larger ones.

3D-Bar

D. Showing several series of data on the same chart, indicating the <u>overall total</u> of the corresponding data points from the series at each X coordinate.

Stacked-Bar

E. Showing <u>trends over time</u> of water levels in a river at several measuring stations.

Line

DATABASES

<13> 8 Points – In lab #6 you set up a query system in Excel to extract **Country** names for countries that matched certain filter criteria. In the following Access query form you are to set up a similar query system, but where we are interested in seeing <u>both</u> the **Country** name <u>and</u> the **Murder** value for all records where the **Literacy** value is between 50 and 75, and where the **Quality** value is between 90 and 100. I also want to see the results sorted in ascending order on the **Country** field. Fill in the form appropriately.

Query1 : Select Query

World
*
Country
Military
Literacy
Murder
Quality
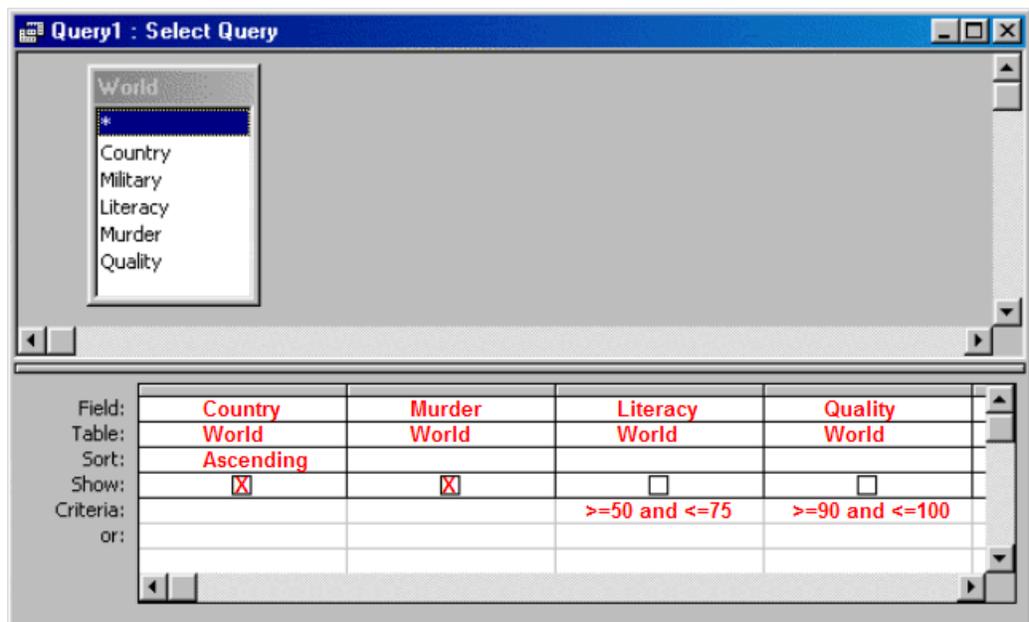
Field:	Country	Murder	Literacy	Quality
Table:	World	World	World	World
Sort:	Ascending			
Show:	X	X	☐	☐
Criteria:			>=50 and <=75	>=90 and <=100
or:				

<14> 6 Points – For each of the following field descriptions list the most appropriate <u>data type</u>. List the size for Text fields and the numeric subtype for Number fields.

|		
A.	State codes (such as MA, NY, OR, etc.)	**Text, 2 characters**
B.	Marital status (single, married, divorced, widowed)	**Text, 1 character**
C.	Tax Rates (percentages between 0.0 and 100.0)	**Number, Single**
D.	Salaries	**Currency**
E.	Temperatures in degrees Fahrenheit (from -40 to +212)	**Number, Integer**
F.	ID Numbers (between 000000 and 999999)	**Number, LongInt**

<15> 8 Points – Set up the following join query so that the result will contain the **When** field, the **Last Name** field, the **Amount** field and the **Code String** field, but only where the ID field of Customers matches the ID field of Transactions and where the Code field of Transactions matches the Code field of Codes. I want to see only those records where the **Amount** field contains a number greater than 100 dollars. Sort the table in descending order on the **Last Name** field.

Query1 : Select Query

Customers: *, ID, Last Name, First name
Transactions: *, When, ID, Code, Amount
Codes: *, Code, Code String

Field:	When	Last Name	Amount	Code String
Table:	Transactions	Customers	Transactions	Codes
Sort:		Descending		
Show:	X	X	X	X
Criteria:			>100	
or:				
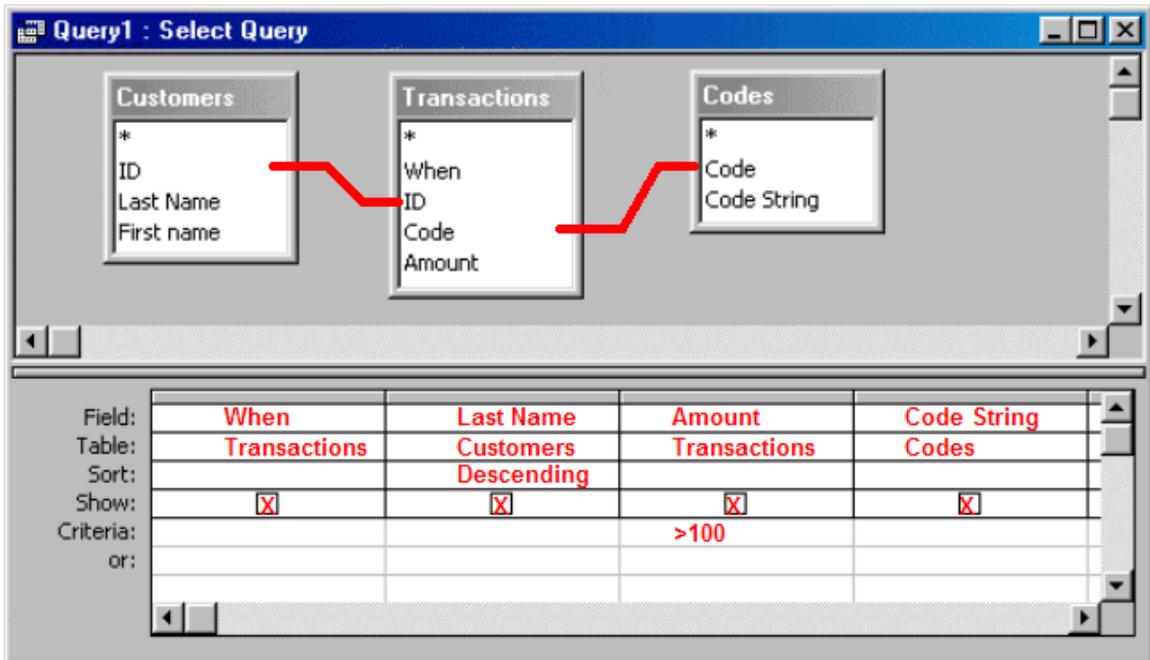
<16> 8 Points – I have a database that uses two tables, and I set up a query to join those tables together to create a composite result. Table #1 (the "left" table) contains 30 records, and table #2 (the "right" table) contains 50 records. On the field used in the join, 20 records from table #1 have identical values with 20 records in table #2 (i.e., there are 20 matches). If I join the two tables together to create a composite result, how many records will result if I set up the join as…

Table #1 = 30   Table #2 = 50

A.   …an inner join?   **20**

B.   …a full outer join?   **60**

C.   …a left outer join?   **30**

D.   …a right outer join?   **50**

10 20 30
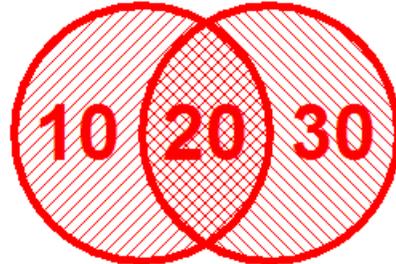
<17> 3 Points – Using the same two tables as in the previous problem, assume that neither table contains an index. What could we say about the data values of the common field used in the join if the result of the join contained 1,500 records?

The number 1,500 is the same as 30×50, which is the total number of comparisons performed by the join. Since the number of records in the result is the same as the number of comparisons, *every* comparison was a match. **The data values in the common field must have all been identical.**

<18> 3 Points – Short Answer – What's the difference between a *__validation rule__* and a *__default value__*?

A validation rule is an expression which limits the values allowable in a data field. A default value is automatically inserted into a field every time a new record is created.

<19> 3 Points – Short Answer – What is *__normalization__* and why is it useful in databases?

Normalization is the process by which a table containing redundant information is decomposed into several tables (along with the relationships between those tables), where each new table contains only unique information. It allows us to create several small tables instead of one large one, each of which is easier to maintain and update than the larger form.

<20> 6 Points – What things can a spreadsheet do that a database cannot? What things can a database do that a spreadsheet cannot? What things can both do (if you beat on them hard enough)?

1.   Spreadsheets

Networks of complicated and interrelated calculations, robust and flexible charting.

2.   Databases

Simple queries, simple calculations (sums and averages of fields), reports for the printer and on-screen forms, JOINS.

3.   Both

Queries, Sorting, Macros.