

**CMPSCI 105 Final Exam
Spring 2016
May 5, 2016
Professor William T. Verts
Solution Key**

GENERAL KNOWLEDGE, SPECIAL TOPICS, & REVIEW

<1> 10 Points – One point each question. Answer *any ten*. Answer more for extra credit. Blank or incorrect answers will be ignored.

F	True or False: A 3½-inch diskette is a “hard disk”.
F	True or False: A USB flash drive is a “hard disk”.
3	How many bits will be in each packet when converting binary to octal?
3.70043	What is the base 2 logarithm of 13?
32768	How many bits are there in four Kilobytes?
F	True or False: 3D adds information to a chart or graph produced in Excel.
Line	Which chart type is best for showing trends over time?
Pie	Which chart type is best for showing proportions of a whole?
Stack Bar	Which chart type shows a total for corresponding points from several series?
T	True or False: A legend is needed when a chart shows multiple series.
F	True or False: Linear Search is faster than Binary Search.
T	True or False: In order to perform a Binary Search, the list must be sorted.
42536	In Excel, May 5, 2016 has value 42355. What then is June 15, 2016?
0.75	What is the internal time fraction returned by =TIME (18 , 0 , 0) ?
NO	Yes or No: Can the value returned by the Excel formula =1/10 be represented <i>perfectly</i> as a double-precision float, with no round-off error?

<2> 5 Points Extra Credit – After two of the quizzes I wrote a “magic number” on screen. What are those magic numbers? (3 points for one, 5 points for both.)

$$2^{16} = 65536, \quad 2^{24} = 16777216$$

<3> 5 Points – One quantity represents the number of centimeters per inch {cm/in}, and another contains the number of centimeters per meter {cm/m}. Which of the following expressions gives me the number of meters per inch {m/in}? Circle the correct answer.

$$\{cm/in\} \times \{cm/m\}$$

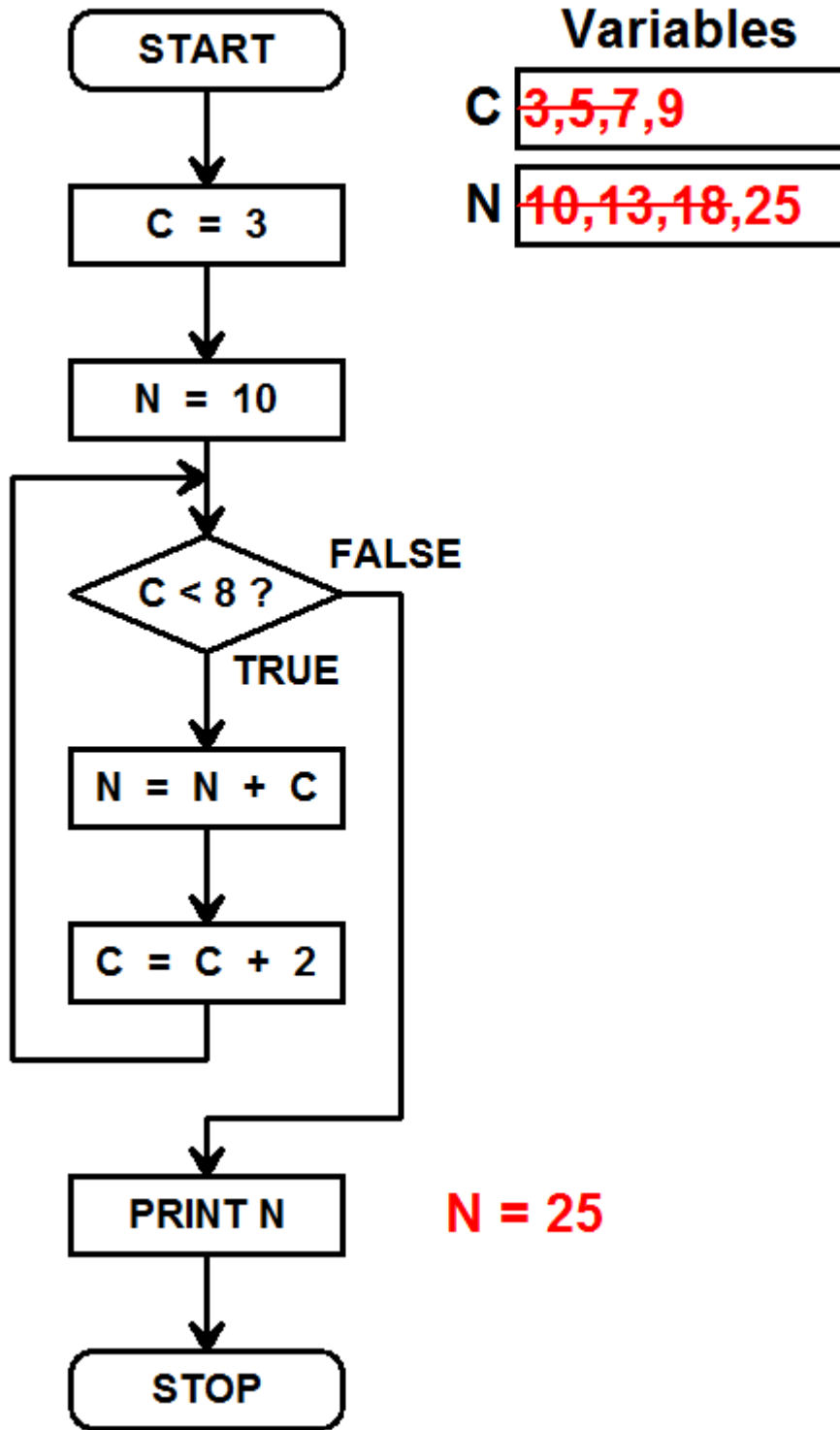
$$\{cm/in\} \div \{cm/m\}$$

$$\{cm/m\} \div \{cm/in\}$$

<4> 5 Points – Short Answer – Why are *comma-and-quote-delimited* text files important to both spreadsheets and databases?

They can be imported easily, edited by a text editor, emailed as message body (not attachment). Accept anything reasonable.

<5> 10 Points – Trace the following flowchart and show the final printed result.



-5 for “off by one” errors of any type (like stopping the loop too early or too late), otherwise full credit or no credit, unless there is a common error mode. Use your discretion.

SPREADSHEETS

<6> 12 Points – *Write a formula* with the **VLOOKUP** function for cell **M11** (using the table in **P10:R16**) to compute the most expensive food item (**Pancakes, Burger**, etc.) that Fred can afford. Write it so that when the formula is copied to **M12:M19** the food items for all remaining people are correct. *Write a second formula* for cell **N11** (also using the table) to compute the price range (**Cheap, Medium**, etc.) for Fred. This formula will be copied to cells **N12:N19**, and also must do the right thing in each cell after the copy.

Your answer for **M11**: **=VLOOKUP (L11, \$P\$10:\$R\$16, 2)**

Your answer for **N11**: **=VLOOKUP (L11, \$P\$10:\$R\$16, 3)**

6 points each: 2 for cell, 3 for range (-1 for no \$), 1 for column

	J	K	L	M	N	O	P	Q	R	S
9										
10		NAME	BUDGET	FOOD ITEM	PRICE RANGE		0	Nothing	Sorry!	
11		Fred	\$17.00				5	Pancakes	Cheap	
12		Sam	\$8.00				10	Burger	Cheap	
13		Mary	\$23.00				15	Chicken	Medium	
14		Carol	\$16.00				20	Sushi	Medium	
15		Joe	\$7.00				25	Prime Rib	Expensive	
16		Bob	\$27.00				30	Sashimi Deluxe	Expensive	
17		Tom	\$9.00							
18		Bill	\$3.00							
19		Sue	\$15.00							
20										

<7> 8 Points – Cell **B2** contains the formula **=INT(NOW())**, where the **INT** function discards any fraction from its argument. The result is formatted as a date, as shown. Write simple formulae using B2 for cells **B3** through **B6** to compute the values indicated by the corresponding text in column **C**. (Cells **B3:B7** will also be formatted as dates.)

	A	B	C	D
1				
2		Thursday, May 05, 2016	RIGHT NOW	
3		=B2+1	TOMORROW	
4		=B2+2	THE DAY AFTER TOMORROW	
5		=B2+7	EXACTLY ONE WEEK FROM TODAY	
6		=B2-60	THE DATE 60 DAYS AGO	
7				

2 points each. -1 if they use NOW () instead of B2

<8> 5 Points – Cell **S10** contains: $=Q8+V15*12- \$T\$9+R\$12-X7$, which is then copied to cell **V15**. What is the resulting formula in cell **V15** after the copy has been completed?

One point for: $= \underline{\quad} + \underline{\quad} *12 - \$T\$9 + \underline{\quad} \$12 - \underline{\quad}$

One point per slot:

$=\underline{T13} + \underline{Y20} *12 - \$T\$9 + \underline{U} \$12 - \underline{AA12}$

<9> 5 Points – Write a formula to compute the average of four items: cell **C5**, cell **C6**, cell **C7**, and the result of adding cells **F1**, **F2**, and **F3**.

$=\text{AVERAGE}(C5:C7, \text{SUM}(F1:F3))$ **Expected answer**

$=\text{AVERAGE}(C5, C6, C7, F1+F2+F3)$ **Allowed answer**

-1 per error, but do not go below zero

<10> 10 Points – Here is a spreadsheet that describes a file containing a video file. In each **empty** outlined cell in column **B** *write a formula* to compute the desired quantity listed in column **C**. Do not compute or use actual numbers! We want formulae that refer only to cells!

	A	B	C	D
1				
2				
3		320	Image Width (Pixels)	
4		240	Image Height (Pixels)	
5		3	Bytes per Pixel (Color)	
6		30	Frames per Second	
7		15	Length of Video (Minutes)	
8		60	Seconds per Minute	
9		$=B3*B4$	Pixels per Frame	
10		$=B9*B5$	Bytes per Frame	
11		$=B10*B6$	Bytes per Seconds	
12		$=B7*B8$	Length of Video (Seconds)	
13		$=B11*B12$	Bytes (Total)	
14				

2 points per formula, -1 per error. Accept any formula that works.

DATABASES

For all database problems on this and the following page use the tables shown here: **Day Names** and **Solar**. Table **Solar** represents the performance of my new roof-top photovoltaic power system, installed in late March, 2016, where the **Daily KWH** field shows the number of kilowatt-hours produced by the system on each day. **Solar** is indexed on the **Calendar Day** field.

Day Code	Day String
SU	Sunday
MO	Monday
TU	Tuesday
WE	Wednesday
TH	Thursday
FR	Friday
SA	Saturday
*	

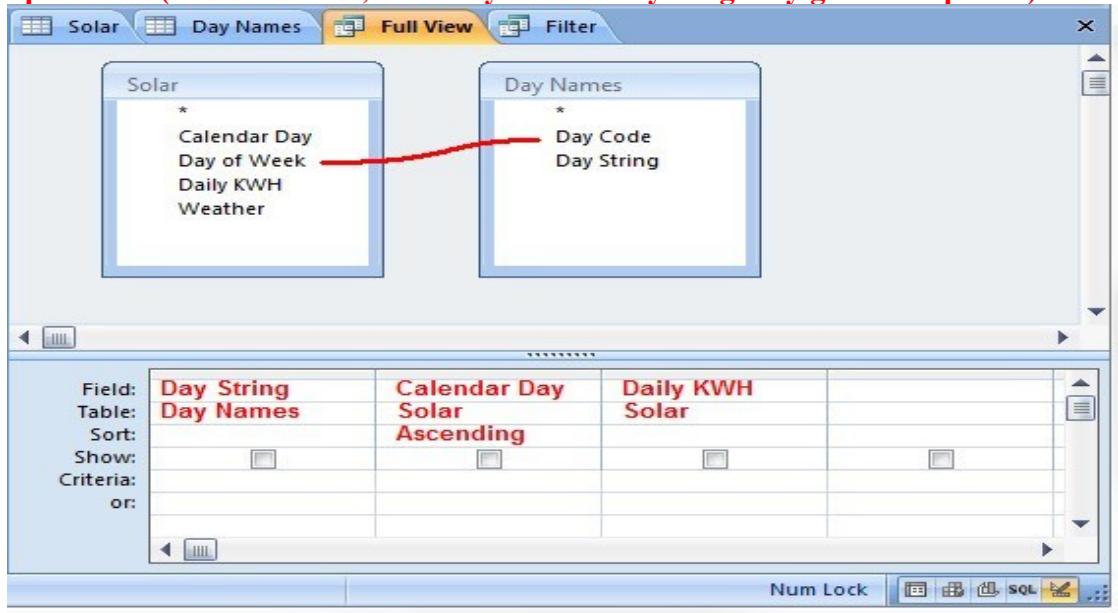
Calendar Day	Day of Week	Daily KWH	Weather
3/29/2016	TU	12	System on at 3:45pm
3/30/2016	WE	66	Sunny
3/31/2016	TH	52	Late clouds
4/1/2016	FR	29	Rainy
4/2/2016	SA	17	Rainy
4/3/2016	SU	39	Snow, then sunny
4/4/2016	MO	0	Snow (6 inches)
4/5/2016	TU	3	Sunny, snow melting
4/6/2016	WE	15	Sunny early, then overcast
4/7/2016	TH	15	Rainy
4/8/2016	FR	32	Sunny early, then overcast
4/9/2016	SA	54	Sunny early, then overcast
4/10/2016	SU	72	Sunny
4/11/2016	MO	12	Rainy
4/12/2016	TU	30	Rainy until 1:00pm, then sunny
4/13/2016	WE	73	Sunny
4/14/2016	TH	75	Sunny
4/15/2016	FR	74	Sunny
4/16/2016	SA	76	Sunny
4/17/2016	SU	72	Sunny
4/18/2016	MO	67	Sunny, some clouds
4/19/2016	TU	63	Cloudy early, then sunny
4/20/2016	WE	78	Sunny
4/21/2016	TH	72	Sunny
4/22/2016	FR	34	Rainy and cloudy, some sun
4/23/2016	SA	62	Cloudy early, then sunny
4/24/2016	SU	77	Sunny
4/25/2016	MO	40	Overcast, some clearing
4/26/2016	TU	10	Rainy
4/27/2016	WE	79	Sunny
*			

<11> 10 Points – Examine the tables closely.

- Does table **Day Names** have an **index**? **NO**
- What is the most appropriate **numeric subtype** of the Daily KWH field? **BYTE**
- What is the minimum possible **field width** of the Day of Week field? **2**
- How many **records** are in the **Solar** table? **30**
- What is the number of the **current record** in the **Solar** table? **9**
- What is the number of the **current record** in the **Day Names** table? **6**
- (2 points) If neither table had an index, how many **comparisons** would be performed in a join where the Day of Week field is joined with the Day Code field? **210**
- (2 points) What kind of **relationship** (1:1, 1:many, many:many) actually now exists between **Solar** and **Day Names** when the Day of Week field is joined with the Day Code field? **Accept either 1:many or many:many**

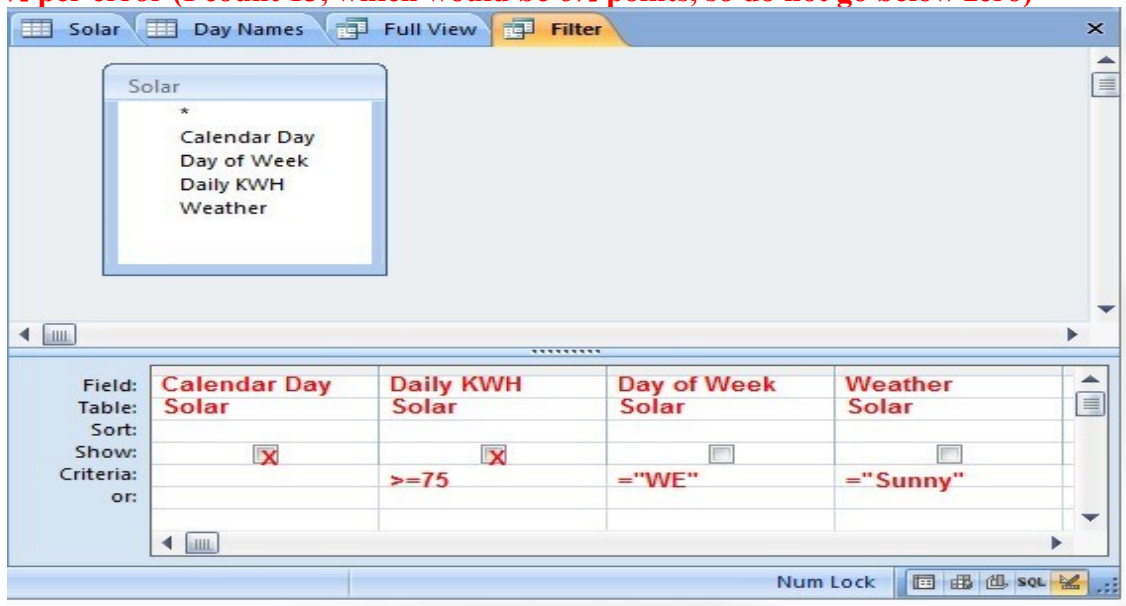
- <12> 10 Points – In the form below, set up a complete *inner join* query between the tables. The result must show the Day String, Calendar Day, and Daily KWH fields (in that order), but only where the Day of Week field matches the Day Code field. The result must be sorted in ascending order on the Calendar Day field. Include everything necessary in the query.

-1 per error (I count 8 total, so if they answer anything they get 2 free points)



- <13> 5 Points – Set up a *simple query* in the form below to list the Calendar Day and Daily KWH fields for all Wednesdays where the daily kilowatt hours is at least 75 and the weather is exactly the string “Sunny”. Include everything necessary in the query.

-½ per error (I count 13, which would be 6½ points, so do not go below zero)



- <14> 5 Points – How many records result from the query in the previous problem?

2 (4/20/2016 and 4/27/2016)