

## Assignment 1: Computer Applications in CEE -- SOLUTION

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### Problem 1

One of the best web sites to learn about the development of computers is the History of Computers Museum (<http://www.computerhistory.org/revolution/timeline>). Look at the Museum timeline and briefly answer the following questions:

- a) In a sentence explain the history behind the term “ computer bug” to represent errors in a computer program.

**Ans.** The term 'computer bug' was first coined by computer scientist **Grace Hooper in 1945** when a moth was stuck between relay contacts of a Harvard Mark II computer.

(<https://computerhistory.org/timelines/> Under 'Timeline of Computing History')

OR

(<https://www.computerhistory.org/timeline/1945/> Under 'First actual case of bug being found')

- b) The Complex Number Calculator (CNC) was introduced in 1940. Briefly state the importance of this system.

**Ans.** The Complex Number Calculator (CNC) (located in New York at the time) was one of the earliest examples of **remote access computing** where calculations were computed remotely on the CNC using a teletype terminal connected to the location of the CNC (New York) over special telephone lines.

(<https://www.computerhistory.org/timeline/1940/> Under 'The Complex Number Calculator (CNC) is calculated')

- c) Name the predecessor of the Internet developed by the Advanced Research Projects Agency (ARPA).

**Ans.** The predecessor of the Internet, developed by the Advanced Research Projects Agency (ARPA) was called 'Intergalactic Network.'

(<https://www.computerhistory.org/internethistory/1960s/> Under '1962')

OR

(<https://computerhistory.org/timelines/> Under 'Internet History, 1962 to 1992'.....will lead to above link)

- d) The IBM 2314 direct access storage facility was introduced in 1965 to support mainframe computers like the IBM 360. Compare the typical storage capacity of the IBM 2314 versus the storage available on your hard drive today.

**Ans.** Direct Access Storage Capacity of the IBM 2314: Eight drives (plus a spare) with removable 29 MB disk packs shared one control unit. The extra drive was a spare for the user or could be worked on by a field engineer while the other eight were in use by the customer. Attached to a System/360 computer, it supported applications like online banking, ATMs, and just-in-time manufacturing.

(<https://www.computerhistory.org/timeline/1965/> Under 'IBM 2314 direct access storage facility')

More details:

- RPM of 2,400
- Access time of 60 milliseconds
- 29 MB type 2316 Disk Pack used with the 2314 employed 20 recording surfaces
- With 8 drives on-line, the system had about 240 MB available to the host

(<https://d1yx3ys82bpsa0.cloudfront.net/groups/ibm-2314.pdf> more details)

e) Name the first successful video game console launched by Atari. Name the year.

**Ans.** Pong was the first successful video game console designed by Al Alcorn launched by Atari in 1972.

(<https://www.computerhistory.org/timeline/1972/> Under 'Pong is released')

(<https://www.computerhistory.org/timeline/graphics-games/#169ebbe2ad45559efbc6eb35720a0f9e> Under '1972')

f) Name the first computer aided system used by General Motors in the early 1960s.

**Ans.** DAC-1 is the first commercially available computer aided design program released in 1960.

(<https://www.computerhistory.org/timeline/1963/> Under 'DAC-1 computer aided design program is released')

g) JPEG is one of the most popular file formats worldwide. State when it was developed and what is the meaning of the word JPEG.

**Ans.** JPEG was developed by 1992 and it stands for Joint Photographic Expert Group.

(<https://www.computerhistory.org/timeline/1992/> Under 'JPEG standard finalized')

h) Explain the purpose of a Graphics Processing Unit (GPU). Name a popular brand of GPUs today.

**Ans.** To mitigate the demand for increased graphical performance required for video applications in personal computers, a Graphics Processing Unit or GPU, which is a processor specially designed to manipulate graphics was developed. Nvidia is a popular brand of GPU today.

(<https://www.computerhistory.org/timeline/1999/> Under 'Nvidia releases the GeForce 256')

i) On January 24, 1984 Apple launches the first Macintosh computer. Explain the significance of this computer in terms of its technology and price.

**Ans.** The Macintosh was the first successful mouse-driven computer with a graphical user interface and was based on the Motorola 68000 microprocessor. Its price was \$2,500. Applications that came as part of the package included MacPaint, which made use of the mouse, and MacWrite, which demonstrated WYSIWYG (What You See Is What You Get) word processing.

(<https://www.computerhistory.org/timeline/1984/> Under 'Apple Computer Launches the Macintosh')

j) Java is one of the most popular languages today. Name the company and the developers of this important language.

**Ans.** Java was developed by the company Sun Microsystems and was developed by James Gosling.

(<https://www.computerhistory.org/timeline/1995/> Under 'Java 1.0 is introduced')

## Problem 2

For your own personal computer find the following:

- Number and model of CPU processor used
- CPU clock speed
- Computer Random Access Memory (RAM) size

- d) Graphics processing unit if any (GPU)
- e) How many bytes does your computer hard drive has to store information?

**Problem 3**

Use the Car Data file posted on Week 1 of our syllabus web page to answer the following questions.

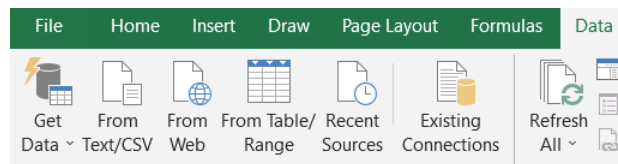
- a) Import the data into an Excel file.
- b) Concatenate the car name with its engine power and create a new column.
- c) Create a new column in the spreadsheet to assign the **engine category** for each car according to the engine horsepower. For this exercise use a VLOOKUP function in Excel to classify the cars according to the following table. IN your answer, show me an example of the Excel formula(s).

Engine Horsepower (HP)	Engine Category
0-75	A
76-120	B
121-185	C
>186	D

- d) Count how many cars belong to each engine power class using the Excel COUNTIF or a variation of commands needed.
- e) Use Excel conditional formatting to color code the values based on car horsepower. Assign red to Engine Category D, purple to Category C, Blue to Category B and Green to Category A.
- f) Repeat the classification problem completed in Part (c) but this time use a series of IF statements instead of the VLOOKUP function. Comment on the complexity and ease of use of both approaches.

**Ans.**

- a)
  - Copy and save data to notepad
  - In excel, go to Data > Get External Data from Text > Select notepad > Load



- b) Column I in the Sheet named 'Problem 3' of the Excel file 'Assignment 1.'  
Command: =CONCATENATE([@Model],"",[@Horsepower])

SUM    X ✓ fx    =CONCATENATE([@Model],"",[@Horsepower])

	A	B	C	D	E	F	G	H	I
1	Model	Country	Type	Weight	Turning Circle	Displacement	Horsepower	Gas Tank Size	b) Concatenate Car Name with Engine Powe
2	130	13.2 Acura Integra 130	C						
3	160	18 Acura Legend V6	C						
4	130	21.1 Audi 100 130	C						
5	108	15.9 Audi 80 108	C						
6	130	15.9 Audi 90 130	C						
7	168	16.4 BMW 325i 168	C						
8	208	21.1 BMW 535i 208	C						

- c) Column J in the Sheet named 'Problem 3' of the Excel file 'Assignment 1.'  
 Command: =VLOOKUP([@Horsepower],\$O\$2:\$P\$282,2) .....\* include \$ for table array to ensure that the entire table array is referenced for each cell

SUM    X ✓ fx    =VLOOKUP([@Horsepower],SQ\$2:SR\$282,2)

	G	H	I	J	K	L	M	N	O	P	Q	R
1	Horsepower	Gas Tank Size	b) Concatenate Car Name with Engine Powe	c) Engine Category with VLOOKUP	f) Engine Category with IF statements		Category	d) Count			Engine Horsepower (HP)	Engine Category
2	130	13.2 Acura Integra 130	C				A	4			0	A
3	160	18 Acura Legend V6 160	C				B	52			2	A
4	130	21.1 Audi 100 130	C				C	52			3	A
5	108	15.9 Audi 80 108	B				D	8			4	A
6	130	15.9 Audi 90 130	C								5	A
7	168	16.4 BMW 325i 168	C								6	A
8	208	21.1 BMW 535i 208	C									

d)

Category	Count
A	4
B	52
C	52
D	8

SUM    X ✓ fx    =COUNTIF(J2:J117,"A")

	G	H	I	J	K	L	M	N
1	Horsepower	Gas Tank Size	b) Concatenate Car Name with Engine Powe	c) Engine Category with VLOOKUP	f) Engine Category with IF statements		Category	d) Count
2	130	13.2 Acura Integra 130	C				A	"A")
3	160	18 Acura Legend V6 160	C				B	52
4	130	21.1 Audi 100 130	C				C	52
5	108	15.9 Audi 80 108	B				D	8

- e) Select column > Conditional Formatting > Highlight Cell Rules > Equal To > type letter and assign color

The image shows the 'Conditional Formatting' menu in Excel. The 'Highlight Cells Rules' option is selected, leading to the 'Equal To' dialog box. In the dialog box, the text 'd' is entered in the input field, and the format is set to 'Light Red Fill with Dark Red Text'.

- f) Column K in the Sheet named 'Problem 3' of the Excel file 'Assignment 1.'  
 Command: `IF([@Horsepower]>186,"D",IF([@Horsepower]<76,"A",IF([@Horsepower]<121,"B","C")))`

	C	D	E	F	G	H	I	J	K
1	Type	Weight	Turning Circle	Displacement	Horsepower	Gas Tank Size	b) Concatenate Car Name with Engine Powe	c) Engine Category with VLOOKUP	f) Engine Category with IF statements
2	Small	2700	37	112	130	13.2	Acura Integra 130	C	<code>IF([@Horsepower]&lt;121,"B","C"))</code>
3	Medium	3265	42	163	160	18	Acura Legend V6 160	C	C
4	Medium	2935	39	141	130	21.1	Audi 100 130	C	C
5	Compact	2670	35	121	108	15.9	Audi 80 108	B	B
6	Compact	2790	35	141	130	15.9	Audi 90 130	C	C
7	Compact	2895	35	152	168	16.4	BMW 325i 168	C	C
8	Medium	3640	39	209	208	21.1	BMW 535i 208	D	D

### Problem 4

Your construction company requests a 10-year loan to purchase five CAT 330D Crawler Excavators. The new equipment costs



\$210,000 per excavator.

- The bank offers a loan at 5.85% per year over 10 years. Find the monthly payments to pay back the loan.
- Estimate the amount of the loan paid as interest to the bank.

**Ans.**

Rate (per month) =  $(5.85/12)\%$

No. of payment periods, Nper (in months) =  $10 \times 12 = 120$

Present value of loan, PV (for 5 CAT 330D Crawler Excavators) =  $210,000 \times 5 = \$1,050,000$

- Monthly payment to pay back the loan = \$11,522

Calculate the monthly payment of a loan for 5 excavators (\$210,000)		
Calculate the equivalent amount paid throughout the loan period		
Loan for 5 CAT 330D	1,050,000	Dollar amount of loan
No. of Periods	120	periods in loan
Interest	5.85%	percent per year
Monthly Payment	(\$11,522.05)	PMT(interest/month,p
Yearly Payment	(\$138,264.56)	
Total Payments	(\$1,382,645.64)	
Loan Interest	\$332,645.64	

b) Loan to be paid for 10 years = \$1.382 million.

Amount of loan paid as interest = \$332,645