

## Assignment 1: Computer Applications in CEE

Date Due: January 31, 2020

Instructor: Trani

### 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) The ERA 1101 was a commercial computer produced by Remington-Rand in the 1950's. State how many bits of information could be stored by this system in its magnetic drum.
- b) Magnetic tapes were used in early computers to store and backup data. Name the company that introduced the first magnetic tape drives for computers. By the way, magnetic tapes are still in use today to perform backups.
- c) Name the automobile company that started using the first computer aided design program - called DAC-1.
- d)
- e) In 1971 the supercomputer was delivered to NASA Ames Research Center. State the name of the computer and the number of processors.
- f) Vint Cerf and Robert Kahn are credited with developing internetworking protocols that resulted in ARPAnet. State the time period of such developments.
- g) State the year when Atari introduces the first game console - the Atari Model 400.
- h) In 1972 the C programming language is introduced to the public. Who was the author of C?
- i) In 1978 the first shared computer (i.e., mini-mainframe) was installed in the White House. Name the computer model and company that produced the mini-mainframe.
- j) In 1983 Nintendo introduces a new gaming console. State the name of the system.

### Problem 2

For your own personal computer find the following:

- a) Number and model of CPU processor used
- b) CPU clock speed
- c) Computer Random Access Memory (RAM) size
- d) Graphics processing unit if any (GPU)
- e) Name and version of the operating system used in your computer

### Problem 3

- a) An algorithm is a series of steps to solve a problem. Describe in a couple of paragraphs the most complex algorithm that you have developed using Excel, an engineering tool (like Matlab or Mathematica) or any programming language.
- b) The Top500 site lists the largest supercomputers worldwide (<https://en.wikipedia.org/wiki/TOP500>). Look at the top 10 supercomputers and tell me what operating system do these systems use.
- c) For the fastest supercomputer in the world, state the highest score of floating point operations (FLOPS) per second (called Rmax) achieved. If a human takes 3 seconds to do a floating point operation, find how many years will a human have to perform calculations to match one second of the top supercomputer computing power.

**Problem 4**

Use the Top 92 longest bridges file posted and answer the following questions.

- a) Import the data into an Excel file.
- b) Create a new column in the spreadsheet to assign the category of each bridge according to the its length. For this exercise use IF statements in each cell to determine the class of bridge.
  - a. "Class 1" if more than 100,000 meters.
  - b. Class 2 if the bridge length is between 99,999 and 30,000 m.
  - c. Class 3 if the bridge length is between 29,000 and 10,000 m..
  - d. Class 4 if the bridge length is less than 9,999 meters.
- c) Count how many bridges belong to each class using the Excel COUNTIF.
- d) Use Excel conditional formatting to color code the values based on length. Assign red to Class 1, blue to Class 2, marron to Class 3 and green to Class 4.

**Problem 5**

Use the **Construction\_firm** data file (in Excel format) posted on Week 2 of our syllabus web page to answer the following questions. The file contains a list of construction vehicles for a company with three office locations.

Location	Equipment	Status	Cost(\$)
Atlanta	Truck	In-service	64,647
Charlotte	Truck	In-service	79,490
Atlanta	Truck	In-service	65,097
New York	Truck	In-service	84,332
New York	Truck	In-service	59,494
New York	Truck	In-service	85,333
Charlotte	Loader	In-service	199,988
New York	Truck	In-service	56,074
Atlanta	Loader	In-maintenance	144,263
Charlotte	Loader	In-transit	148,946
Charlotte	Truck	In-transit	81,672
Charlotte	Truck	In-service	47,606
Charlotte	Truck	In-service	85,333

- a) Estimate the total cost of the construction vehicles for this company.
- b) Count the number of trucks in the company inventory using the "countif" function.
- c) Repeat for loaders and scrapers.
- d) The company estimates the following operating costs for each type of construction vehicle:
  - a. Trucks = \$185/hr
  - b. Loaders = \$250/hr
  - c. Scrapers = \$210/hr

Create a table lookup section in the spreadsheet (similar to that shown below) and add a column (column E) to the original spreadsheet to assign the hourly operating cost to each entry in the spreadsheet. Use the Excel "vlookup" function to do this task. In your answer I would like to see the syntax used in the cells (in column E) to calculate the hourly cost.

Location	Equipment	Status	Cost	Operating Cost(\$/hr)	Equipment	Operating Cost (\$/hr)
Atlanta	Truck	In-service	64647	150	Truck	150
Charlotte	Truck	In-service	79490	150	Loader	230
Atlanta	Truck	In-service	65097	150	Scrapper	190
New York	Truck	In-service	84332	150		
New York	Truck	In-service	59494	150		
New York	Truck	In-service	85333	150		
Charlotte	Loader	In-service	199988	230		
New York	Truck	In-service	56074	150		