

Assignment 1: Computer Applications in CEE

Date Due: January 30, 2017

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) In two sentences explain what is virtual memory and how it works.
- 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 country that used the ENIGMA encryption device. In a sentence explain how the ENIGMA codes were decoded.
- d) This early smart phone was perhaps the first one with a web browser application. Name the company that produced this device around 1997.
- e) The Apollo Domain DN100 was one of the earliest workstations. Name the operating system used by this workstation.
- f) Name two contributions of the Xerox Palo Alto Research Center (PARC).
- g) Name the physicist and the laboratory that developed hypertext and paved the way for the development of the World Wide Web.
- h) Name the California-based company that developed the first relational database.

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 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) Create a new column in the spreadsheet to assign the category of each car according to the engine horsepower. For this exercise use IF statements in each cell to determine the class for each vehicle.
 - a. Class 1 if the vehicle horsepower is less than 80 HP.
 - b. Class 2 if the vehicle horsepower is between 81 and 130 HP.
 - c. Class 3 if the vehicle horsepower is between 131 and 200 HP.
 - d. Class 4 if the vehicle horsepower is greater than 200 HP.
- c) Count how many cars belong to each class using the Excel COUNT or COUNTA function (as applicable).
- d) Use Excel conditional formatting to color code the values based on car weight. Assign red to the highest weights and green to the lowest weights.

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	85,270

- 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 = \$180/hr
 - b. Loaders = \$240/hr
 - c. Scrapers = \$200/hr

Create a table lookup section in the spreadsheet (as 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		