Final Exam, Computer Portion Sample Questions

General Instructions. This portion of the final exam will be given on Monday November 24 in lecture. You must bring your laptop to lecture, or a 25 point penalty will be assessed. It is suggested to bring a powercord and a mouse. Failure of a laptop battery during the exam will result in a penalty of 25 points and that you leave your laptop with us while you retrieve your powercord.

This exam contains two questions. The first question requires creating and then graphing theoretical data. The second question requires creating a graph of experimental data. Below are sample questions, coordinated with sample answers given in the worksheet **CES Excel Exam F08**.

This file must be downloaded before coming to lecture on Monday November 24, or a penalty of 15 points will be assessed. This file will be available on Blackboard until Sunday November 23 at midnight. Once you download the file, it should be renamed as "CES-Section-USERID". If Dr Stephan was to take this exam and she was enrolled in CES 102-100, her file would be named "CES-100-BETHSTE". Failure to name the file correctly will result in a penalty of 10 points.

All work must be completed in this worksheet on the tab pre-labeled for your section. All tabs are currently "locked", and will be "unlocked" in lecture. On the top of this worksheet, you will be required to enter your name, userid, and section. Failure to do so will result in a 10 point penalty. You may not copy any data into another workbook or another worksheet. All graphs that are created must be placed on a separate sheet (not imbedded in the worksheet) and the tabs labeled "Q1 Graph" and "Q2 Graph". All data shown must be given in a "reasonable" number of digits. You will not need to write a problem statement on the worksheet.

Due to the time limitations of the course, you will have ½ hour to complete both questions. After the ½ hour, we will collect the exams on a memory stick. During the exam and collection period, there will be NO TALKING, or you will be dismissed from the exam with a zero. Any use of wireless capabilities during the exam period is prohibited; any use will result in dismissal and a zero on the exam. Be sure ALL internet systems (including IM) are shut down before the exam begins. You are not allowed to have any other computer applications or files open other than the exam; any use will result in dismissal and a zero on the exam.

Each question format is described below. On exam day, you will be provided with a specific question set similar to the ones located in the boxes below. You are not allowed to have a notes sheet on this exam.

Final Exam, Computer Portion Sample Questions

Problem 1. This question requires creating a graph of theoretical data. You will be given an equation and told which parameter is the independent variable, to be graphed on the abscissa, and which parameter is the dependent variable, to be graphed on the ordinate. Sometimes this may require the equation to be manipulated before it is put into the Excel worksheet. The units provided will be consistent, requiring NO unit conversions. Each equation will involve parameter constants. The parameter constants must be correctly documented in the box provided at the top of the worksheet, including name, abbreviation, value and units. Any time the parameter constant is used in the equation, it must be referred to using absolute referencing. If a numerical constant is used (such as π or e), it must be referred to using Excel functions. The independent variable series must be created using a recursion formula. The independent and dependent variables must be correctly labeled, including name, abbreviation, and units. All labels must be shown in the colors indicated on the exam question. All proper plot rules should be applied. A sample question, similar to the one provided for you on exam day, is shown in the box below.

Sample 1. The volume (V, [cc]) of a cylinder is related to its height (H, [cm]) by:

$$V = \pi r^2 H$$

A cylinder of radius 5 cm is slowly filled with water. The volume of water begins at 30 cc and is increased in increments of 20 cc until a volume of 530 cc is reached. Calculate the theoretical value of the height at each volume increment. Plot the results with the volume on the abscissa, and the height on the ordinate. Color all parameter labels in a cell pattern of dark blue, with white text letters. Title the chart "Final Exam, Question 1 Sample".

Other sample questions (you figure out possible questions and units).

- The density of an object (ρ) is its mass (m) divided by the volume (V) it occupies: $\rho = \frac{m}{V}$.
- An object's mass (m) can be converted to an amount of energy (E) given by $E = mc^2$, where c is the speed of light, which is approximately 3 x 10^8 m/s.
- The hydrostatic pressure in an open container of fluid is related to the fluid's density (ρ), the acceleration of gravity (g), and the fluid depth (H) at that point: $P_{hydro} = \rho g H$
- The potential energy of an object is related to its mass (m), the acceleration of gravity (g), and the height (H) to which the object is raised: $PE = mgH$
- The heat (Q) required to cause a change in temperature (ΔT) of an object is related to its mass (m) and its specific heat (Cp): $Q = mCp\Delta T$

Final Exam, Computer Portion Sample Questions

Problem 2. This question requires creating a graph of experimental data. You will be given several columns of numbers, and told during the exam which columns contain the data you are required to use. All other columns of numbers should be ignored. You will be told which column contains the independent variable, to be graphed on the abscissa, and several columns which contain the dependent variable, to be graphed on the ordinate. The data must be graphed from the original location, and not copied to another area on the worksheet and then graphed. After a single graph is created with multiple curves, you will be required to add properly formatted trendlines to the data. You will be told the type of trendline to add. A sample question, similar to the one provided for you on exam day, is shown in the box below

> **Sample 1.** An engineer working for Rubbermaid is experimenting with different container shapes that will enclose the same volume in order to find the shapes most appealing to consumers. Column 6 contains a series of cylinder heights (H, in units of centimeters). Columns 2, 4 and 8 contain corresponding cylinder radii (r, in units of centimeters) that will result in container volumes of approximately 50 cc, 200 cc, and 500 cc respectively. Create a single graph with three curves (one curve for each container volume) of the measured container dimensions that result in each enclosed volume. Use Excel's trendline feature to model each data set as a power relationship to help the engineer select from any combination of dimensions that will result in each enclosed volume. Title the chart "Final Exam, Question 2 Sample". All proper plot rules should be applied.

Other sample questions (you figure out possible questions and units).

- Column 3 contains the displacement of a spring; Columns 1, 9, and 10 contain the force required to create the displacement for three different springs labeled Spring A, B and C respectively. Model the data using a linear relationship.
- Column 1 contains time; Columns 9, 12, and 25 contain the concentration of a radioactive element for three isotopes: actinium, nobelium, and uranium respectively. Model the data using an exponential relationship.