CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

ETT 101 Lab Elena Harris

Lab 7: Excel Assignment "Solving Engineering Problems with Excel"

Objectives and Assignment details

Some of the engineering problems can be solved using Excel. Calculations that require extensive repetitions of the same procedure to different data can be programmed using Excel formulas, and calculations for a huge set of data is then done merely by copying the formulas over all data entries.

In an Excel document "Lab7_Example.xls", you can see how formulas are used to solve three different mathematical procedures:

1. Given an equation for parabola (given by coefficients of the quadratic equation), find the vertex of the parabola (coordinates *x* and *y* of the vertex).
2. Given a quadratic equation (by coefficients), find the roots of the quadratic equation using completing square procedure.
3. Given a quadratic equation (by coefficients), find the roots of the quadratic equation using a formula for finding roots.

Your task is to program a procedure for finding *x* and *y* given a system of linear equations.
For example, assume that you need to solve the system of linear equations:
$3x + 2y = 2$ (I)
$-2x + y = 8$ (II)

Procedure for finding *x* and *y* is:

1. Multiply (I) by the coefficient of *x* in (II) (i.e. multiply equation I by -2)
   $(-2) \cdot 3x + (-2) \cdot 2y = (-2) \cdot 2$
   $-6x - 4y = -4$ (III)

2. Multiply (II) by the coefficient of *x* in (I) (i.e. multiply equation II by 3)
   $3 \cdot (-2x) + 3 \cdot y = 3 \cdot 8$
   $-6x + 3y = 24$ (IV)

3. Subtract IV from III:
   $-6x - 4y = -4$ (III)
   $-6x + 3y = 24$ (IV)
   $-7y = -28$ (V)

4. Find *y* from (V):
   $y = (-28)/(-7) = 4$ (VI)

5. Substitute y from VI into I to find x:
   $3x + 2y = 2$
   $3x + 2 \cdot 4 = 2$
   $3x = 2 - 8$
   $3x = -6$
   $x = -6/3 = -2$

   Solution: $x = -2$, $y = 4$

Your task is to use appropriate formulas in Excel that will allow to find x and y satisfying the system of linear equations given by coefficients. Assume that a general form of a system of linear equations is given by:
$Ax + By = E$
$Cx + Dy = F$

and that coefficients A, B, E, C, D, F are given to you. Also assume that all systems of linear equations that will be given to you will have a single solution.

Lab Submission:

- Show your final solution to the instructor for grading.
- Due time by 5:50 P.M.