King Fahd University of Petroleum and Minerals
College of Computer Sciences and Engineering

CISE 301 – Numerical Methods (T152)

Homework # 03 (due date & time: Sunday 21/02/2016 during class period)

***** Show all your work. No credit will be given if work is not shown! *****

Problem 1 (20 points): Given the equations

$$10x_1 + 2x_2 - x_3 = 37$$
$$-3x_1 - 6x_2 + 2x_3 = -64.5$$
$$x_1 + x_2 + 5x_3 = -20.5$$

(a) **(15 points)** Solve by naive Gauss elimination. Show all steps of the computation.
(b) **(5 points)** Substitute your results into the original equations to check your answers.

Problem 2 (20 points): Given the equations

$$8x_1 + 2x_2 - 2x_3 = -1$$
$$10x_1 + 2x_2 + 4x_3 = 8$$
$$12x_1 + 2x_2 + 6x_3 = 9$$

(a) **(15 points)** Solve by Gauss elimination with partial pivoting. Show all steps of the computation.
(b) **(5 points)** Substitute your results into the original equations to check your answers.

Problem 3 (30 points): Given the system of equations

$$-3x_2 + 7x_3 = 4$$
$$x_1 + 2x_2 - x_3 = 6$$
$$5x_1 - 2x_2 = 2$$

(a) **(10 points)** Solve by Cramer's rule. Show all steps of the computation.
(b) **(15 points)** Solve by Gauss elimination with partial pivoting. Show all steps of the computation.
(c) **(5 points)** Substitute your results back into the original equations to check your solution.

Problem 4 (30 points): Given the system of equations

$$x_1 + x_2 - x_3 = -3$$
$$6x_1 + 2x_2 + 2x_3 = 1$$
$$-3x_1 + 4x_2 + x_3 = 2.75$$

Solve using each of the following methods:
(a) **(10 points)** Naive Gauss elimination. Show all steps of the computation.
(b) **(10 points)** Gauss elimination with partial pivoting. Show all steps of the computation.
(c) **(10 points)** Gauss-Jordan without partial pivoting. Show all steps of the computation.