RENSSELAER POLYTECHNIC INSTITUTE
TROY, NY

ENGR-1100 INTRODUCTION TO ENGINEERING ANALYSIS
Spring 2010

Test 3

8:00 – 9:50
Please state clearly all assumptions made in order for full credit to be given.

NAME: ____________________________ Section: ___________

RIN: ______________________________

Wednesday, April 21, 2010

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<th>Problem</th>
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Problem 1 (25 Points)

Given
\[
\begin{align*}
x + 5y + 2z &= 1 \\
x + y + 7z &= 0 \\
-3y + 4z &= 0
\end{align*}
\]

a) Write the above system of equations in the form \( AX=B \). Identify each of the matrices \( A \), \( X \), and \( B \) respectively
b) Find \( A^{-1} \) the inverse of matrix \( A \)
c) Solve the system of equations by matrix inversion method (i.e., using matrix \( A^{-1} \)).
d) Find the Cofactor of the member \( a_{22} \)
Problem 2 (25 Points)

Rod AB is connected at A by a ball-and-socket support and by two cables BD and BE.

a) Draw a complete and separate FBD for the rod  

b) (Neglect the weight of the rod). Determine the support reactions at point A  

c) Determine the magnitude of the tension in both cables
Problem 3 (25 Points)

For the truss shown,

a) Determine the reactions at both supports (7 pts)

b) Determine the forces in members BC, BE, and CE and state whether they are in tension or compression. The length of all members is 3 meter. (18 pts)

**Note:** You need to draw all FBD’s to receive full credit
Problem 4 (25 Points)

For the frame shown below all the connections are made by frictionless pins

a) Determine all the forces acting on member ACEF (20 pts)
b) Determine the components of the reactions at both supports (B and F) (5 pts)

For full credit you must show appropriate free body diagrams to support your work.