Mathematics 105   Name: _____

Professor Alan H. Stein

Due Wednesday, November 28, 2006   This problem set is worth 100 points.

Make sure that you check the course website for instructions, fill out the pledge form and hand it in with your paper. The instructions for problem sets and take-home examinations along with the pledge form are available from the *General Policies* portion of the web site. *No paper will be accepted without a signed pledge form.* Remember that your paper may be handed in before the deadline but that no late papers will be accepted regardless of the reason. The course website also includes an explanation of how your average will be calculated if you fail to complete this assignment.

Note that, since most of the calculations involved can be done routinely using either a calculator or a symbolic manipulation program such as Maple or Mathematica, it will obviously be necessary to show, through your work, exactly how you came up with your solutions.

For the purpose of calculating averages, this problem set will be treated as if it was a regular exam and will show up as **e3** *on HuskyCT. If you've underperformed on the first two exams, this is a golden opportunity to raise your average.*

1. Use Gauss-Jordan Elimination to find the inverse of the matrix $\begin{pmatrix} 1 & 5 & 2 \\ 3 & 1 & 0 \\ -2 & 2 & 1 \end{pmatrix}$.

2. Consider a maximum problem with the following initial simplex tableau.
$$\begin{pmatrix} 2 & 3 & 1 & 1 & 0 & 0 & 5 \\ 4 & 1 & 2 & 0 & 1 & 0 & 11 \\ 3 & 4 & 2 & 0 & 0 & 1 & 8 \\ -5 & -4 & -3 & 0 & 0 & 0 & 0 \end{pmatrix}$$
Assuming the variables are x, y, z and the objective function is M, find the values of the variables at which the objective function is maximized and find that maximum value.

3. Consider the following linear programming problem:

$3x + y \geq 6$
$x + y \geq 4$
$x + 3y \geq 6$
$x \geq 0, y \geq 0$
$m = 200x + 160y$

The objective function m is to be minimized.

(a) Solve the problem geometrically.

(b) Set up the initial simplex tableau.

(c) Solve the problem using the Simplex Method.

Obviously, the minimum values you get for m using the two di erent methods should be in agreement.

For each of the following exercises, assume an annual interest rate of 5 percent, compounded monthly. For each question, clearly show any formulas you use and clearly define any variables.

4. What is the effective annual yield of any funds invested?

5. What is the future value, in twenty years, of $500?

6. You are entitled to receive a lump sum of $40,000 in ten years. What is its present value?

7. If you save $200 each month for twenty years, what will the balance be at the end of twenty years?

8. If you save $200 each month for twenty years and then leave the balance alone for ten more years, what will the balance be at the end of thirty years?

9. How much must you save monthly in order to be a millionnaire in a quarter century?

10. If you take out a thirty year mortgage for $150,000, what will your monthly payment be? *Extra Credit: What will your balance be after fifteen years?*

Extra Credit

Extra credit will be awarded for the best joke. All jokes must observe standards of good taste. The determination of the best joke will be made by popular vote in class when the papers are returned.