COSC 480/MATH 482
Homework #4
Fall 2012

Problem 1

Consider the following:

Maximize: $Z = 2x_1 + 5x_2 + 3x_3$
Subject To: $x_1 - 2x_2 + x_3 >= 20$
$\quad\quad 2x_1 + 4x_2 + x_3 = 50$
With: $x_1, x_2, x_3 >= 0$

Using the Big M method, construct the complete first simplex tableau for the simplex method and identify the corresponding initial BF solution. Then, work through the simplex method, step-by-step. Show all work. Be sure to indicate your final answer.
Source: Hillier & Lieberman 4.6.7

Problem 3

Dean's Furniture assembles regular and deluxe kitchen cabinets from precut lumber. The regular cabinets are painted white, and the deluxe are varnished. Both painting and varnishing are carried out in one department. The daily capacity of the assembly department is 200 regular cabinets and 150 deluxe. Varnishing a deluxe unit takes twice as much as time as painting a regular one. If the painting/varnishing department is dedicated to the deluxe units only, it can complete 180 units daily. The company estimates that the revenues per unit for the regular and deluxe cabinets are $100 and $140, respectively. Determine the optimal production schedule.

Solve via CPLEX. Put solution in your write up and email me with your .lp file.

Source: Taha 3.6d.7

Problem 4th Amendment

In the land of Neverland, there was a very special boy. That boy, was of course, Dan. Dan was awesome, he had these swords and could fly and stuff. The trouble was that he kept losing his shadow. No, unlike that other guy Peter, his shadow didn't just detatch (is that a word?) itself and go on merry adventures without him rather, Dan's lost shadow is a story of tragedy wrapped up in an enigma of injustice. See, the mean ol' Captain Hook had himself a constable (we'll call him, erm, Odo) that he was paying off and Odo would go and rummage through poor Dan's stuff until he found the magic tab that unhooked Dan's shadow. Then he would take the shadow and lock the shadow up. To free the shadow, Dan has to answer the following two riddles:

1. Odo wants to run a ruthless tropical fruit business. He has the ability to "acquire" 500 coconuts and 300 pineapples every day and sell them to his customers. His cost per coconut is roughly $0.30 and cost per pineapple is $0.25 (you know, in getaway cars, disguises, spy gear, stuff that crooks use). He markets his "totally legit merchandise" at $2.00 per coconut, and $2.25 per pineapple. If he can only sell 350 units per day, how many coconuts and how many pineapple should he get? At what price point does the majority of the fruit go from coconut to pineapple (or vice versa)?

2. Poor Odo has been caught by the Neverland Internal Affairs department and has to get out of town. He has a flight out of Neverland Interdimensional Airport for 4 that afternoon. As he gets to the terminal he realizes there are 99 other people waiting to board the plane and that seat assignments were done before hand. This is bad, because then the authorities at the other airport will be waiting for him and know what seat he was in. So, he decides to convince the first guy in line to choose a random seat instead of the one on his ticket (note - random could mean he sat back in his own seat). The other 98 folks ahead of him will either sit in their assigned seat, or if that seat is taken, sit in a random seat. What's the chance that poor Odo will end up in his assigned seat anyways?

Source: More strangeness? I swear I get weirder and weirder every day.