[Homework can be handed in to me or to my mail box in the Math Lounge (opposite the Math main office). Please show your work to receive full credit.]

A. An intramural four-man basketball team is trying to choose its starting line-up from a six-man roster so as to maximize average height. The roster follows:

Player	*Number*	*Height**	*Position*
Dave	1	10	Center
John	2	9	Center
Mark	3	6	Forward
Rich	4	6	Forward
Ken	5	4	Guard
Jim	6	-1	Guard

* In inches over 5'6".

The Starting line-up must satisfy the following constraints:

i) At least one guard must start.
ii) Either John or Ken must be held in reserve.
iii) Only one center can start.
iv) If John or Rich starts, then Jim cannot start.

Formulate this problem as an integer program.

B. Consider the plane purchasing problem from the lecture:

$$\begin{array}{lrcrcl} \max & 5x_1 & + & 6x_2 & & \\ \text{s.t.} & x_1 & + & x_2 & \leq & 6, \\ & 5x_1 & + & 9x_2 & \leq & 45, \\ & x_1 \geq 0, & & x_2 \geq 0, & & \text{integer.} \end{array}$$

Apply the branch & bound algorithm to this IP to find an optimal solution. Branch on x_2 from the initial LP relaxation L_0.

C. Consider the following IP in 2 variables:

$$\begin{array}{lrcrcll} \max. & x_1 & + & x_2 & & & \\ \text{s.t.} & -x_1 & + & 2x_2 & \leq & 0, & \\ & x_1 & & & \leq & 1, & \\ & & & 4x_2 & \geq & 1, & x_1,\ x_2 \ \text{integer.} \end{array}$$

Apply the branch & bound algorithm to this IP to determine if it has an optimal solution and, if so, find an optimal solution.

D. Consider the following IP in 2 variables:

$$\begin{array}{lrcrcl} \max & x_1 & + & 5x_2 & & \\ \text{s.t.} & 3x_1 & + & 2x_2 & \leq & 18, \\ & -4x_1 & + & 3x_2 & \leq & 6, \\ & x_1 \geq 0, & & x_2 \geq 0, & & \text{integer.} \end{array}$$

Apply the branch & bound algorithm to this IP to determine if it has an optimal solution and, if so, find an optimal solution.