INEG 450 INDUSTRIAL MANAGEMENT
PROBLEM SET II

1. Define "decision" and state its relation to planning.

2. What are the types of decisions? Define them briefly.

3. What are the three levels of certainty?

4. Explain how decision making from the perspective of:

   a) Optimistic decision maker,
   b) Pessimistic decision maker,
   c) Hurwicz approach,
   d) Equal likely approach, and
   e) Minimax regret approach

5. You operate a small wooden toy company making two products: alphabet blocks and wooden trucks. Your profit is $30 per box of blocks and $40 per box of trucks. Producing a box of blocks requires one hour of woodworking and two hours of painting; producing a box of trucks takes three hours of woodworking, but only one hour of painting. You employ three woodworkers and two painters, each working 40 hours a week. How many boxes of blocks (B) and trucks (T) should you make each week to maximize profit? State the objective function and constraints. Solve graphically as a linear program and confirm analytically.

6. A calculator company produces a scientific calculator and a graphing calculator. Long-term projections indicate an expected demand of at least 100 scientific and 80 graphing calculators each day. Because of limitations on production capacity, no more than 200 scientific and 170 graphing calculators can be made daily. To satisfy a shipping contract, a total of at least 200 calculators much be shipped each day. If each scientific calculator sold results in a $2 loss, but each graphing calculator produces a $5 profit, how many of each type should be made daily to maximize net profits?

7. You need to buy some filing cabinets. You know that Cabinet X costs $10 per unit, requires six square feet of floor space, and holds eight cubic feet of files. Cabinet Y costs $20 per unit, requires eight square feet of floor space, and holds twelve cubic feet of files. You have been given $140 for this purchase, though you don't have to spend that much. The office has room for no more than 72 square feet of cabinets. How many of which model should you buy, in order to maximize shorage volume?

8. You must decide whether to buy new machinery to produce product X or to modify existing machinery. You believe the probability of a prosperous economy next year is 0.6 and of a recession is 0.4. Prepare a <u>decision tree</u>, and use it to recommend the best course of action. The applicable payoff table of profits (+) and losses (-) is:

	1 (prosperity)	2 (recession)
A_1 (buy new)	$+950,000	$-200,000
A_2 (modify)	+700,000	+300,000

9. If you have no idea of the economic probabilities (p_j) in question (9), what would be your decision based on uncertainty using (a) maximax, (b) maximin, (c) equal likely, and (d) minimax regret assumptions?

10. You are considering three investment alternatives for some spare cash: Old Reliable Corporation stock (A_1), Fly-By-Nite Air Cargo Company stock (A_2), and a federally insured savings certificate (A_3). You expect the economy either "boom" ($_1$) or "bust" ($_2$), and you estimate that a boom is more likely ($p_1 = 0.6$) than a bust ($p_2 = 0.4$). outcomes for the three alternatives are expected to be

    a) $2000 in boom or $500 in bust for ORC,
    b) $6000 in boom, but $-500 (loss) in bust for FBN, and
    c) $1200 for the certificate in either case.

    Setup a payoff table (decision matrix) for this problem, and show which alternative maximized expected value.

11. If you have no idea of the economic probabilities (p_j) in (10), what would be your decision based on uncertainty using (a) maximax, (b) maximin, (c) equally likely, and (d) minimax regret assumptions?