Linear Programming Practice Problems

P1. A diet needs to include at least 140 mg of Vitamin A and at least 145 mg of Vitamin B. These requirements are to be obtained from two types of food. Type X contains 10 mg of Vitamin A and 20 mg of Vitamin B per pound. Type Y contains 30 mg of Vitamin A and 15 mg of Vitamin B per pound. If type X food costs $12 and type Y food costs $8 per pound, how many pounds of each type of food should be purchased to satisfy the requirements at the minimum cost? What is the minimum cost?

P2. A company produces two models of light fixtures, A and B, each of which much be assembled and packaged. The time required to assemble model A is 12 minutes, and to assemble model B it takes 18 minutes. It takes 2 minutes to package model A and 1 minute to package model B. Each week there are 240 hours of assembly time and 20 hours of packaging time available. If model A sells for $35 and model B sells for $40, how many of each model should be produced to obtain the maximum weekly income? What is the maximum weekly income?

P3. A company manufactures two types of clocks, Model 82 and Model 47. There are three stations, A, B, and C, on the assembly line. Model 82 requires 30 minutes at station A, 20 minutes at station B, and 12 minutes at station C. Model 47 requires 15 minutes at station A, 30 minutes at station B, and 10 minutes at station C. Station A can be operated for no more than 4 hours per day, station B can be operated for no more than 6 hours, and station C can be operated for no more than 8 hours. If the profit on each Model 82 is $20 and on model 47 is $12, how many of each should be assembled each day to maximize profit? What is the maximum daily profit?

P4. Sandra is taking a private school entrance exam. She can answer no more than 40 questions. For each multiple choice question she takes 2 minutes to answer and gets 4 points.
For each true/false question she takes 1 minute to answer and gets 1 point. There are 20 true/false and 40 multiple choice questions. She has 1 hour to take the test. What is her possible maximum score? How many of each question does she need to correctly answer to earn that score?

P5. Joe has a small carpentry shop in his basement where he makes bookcases. He makes two sizes, large and small. His profit on a large bookcase is $50 and his profit on a small bookcase is $20. It takes Joe 6 hours to make a large bookcase and 2 hours to make a small one. He can spend only 24 hours each week on his carpentry work, and he must make at least two of each type each week. How many of each size should Joe make each week to obtain the maximum weekly profit? What is the maximum weekly profit?