

Linear Programming Practice

1. You are Kim Addinwell, the Chief Mathematician for Sell-A-Lot's million dollar Vitamin Research Project. Your scientists have been studying the combined effects of new vitamins Q and R on the human system, and have turned to you for analysis of their findings:
- The body can safely tolerate no more than 600 milligrams per day of vitamin Q, and no more than 500 milligrams per day of vitamin R.
 - The total amount of milligrams per day of the two vitamins must be between 400 and 1000, inclusive.
 - Due to the combined effect of the two vitamins, the number of milligrams per day of vitamin R must be more than $1/2$ the number of milligrams per day of vitamin Q, but less than or equal to 3 times the number of units per day of vitamin Q.

If the cost to produce vitamin Q is 0.06 cents per milligram (**not** \$0.06!) and the cost for vitamin R costs 0.05 cents per milligram, what combination of vitamins Q and R will give the minimum cost?

2. Suppose that you work for a small company that makes high-quality two-way radios. The company wishes to optimize the numbers of the two models they produce, the "TalkAbout" model, and the "Stealth" model.
- The assembly lines can produce no more than 25 TalkAbouts and 16 Stealth per day.
 - No more than 32 two-way radios, total, can be produced per day.
 - They can spend a total of no more than 189 man-hours a day assembling radios. It takes 7 man-hours to build an TalkAbout and 3 man-hours to assemble a Stealth.
 - They can spend at most 68 man-hours per day on testing radios. It takes 1 hour to test an TalkAbout and 4 man-hours to test a Stealth.
 - The number of TalkAbouts produced per day must be more than half the number of Stealths.

The company makes a profit of \$40 on each TalkAbout and \$20 on each Stealth. Find the optimum point at which the daily profit is a maximum, and the number of dollars they would earn per day by operating at this point.

3. You are to take a mathematics achievement test. Two days before the test you receive the following instructions concerning the point values of the two kinds of questions, and how many of each you must answer.
- There are 10 questions worth 7 points each, and 16 questions worth 5 points each.
 - You can receive credit for a maximum of 20 questions. Any others you answer will not be scored.
 - To receive any credit at all, you must answer at least 5 questions.
 - The number of 5 point questions you answer must be no more than twice the number of 7 point questions.
 - The number of 5 point questions you answer must be more than $1/2$ the quantity (the number of 7 point questions minus 5).

What are the optimum numbers of 5 and 7 point questions to answer in order to maximize your score? What is the maximum feasible score?