

Homework 8: Integer programs

Due date: 11:00pm on Sunday April 15, 2018

See the course website for instructions and submission details.

1. **Thrift store.** How should you make change for 99 cents if the goal is to minimize the total weight of the coins used? You may use any number of each type of coin. Here are the weights of each coin:

Type of coin	penny	nickel	dime	quarter
Weight (grams)	2.500	5.000	2.268	5.670

2. **Checked luggage.** You're trying to pack as many souvenirs as possible to bring home from your trip, but your suitcase has a limited capacity. It can hold a maximum of 30 pounds of weight and 15 gallons of volume. Which souvenirs should you pack? The weights and volumes are as follows:

Souvenir number	1	2	3	4	5	6	7	8	9	10
Weight (lbs)	5	6	7	6	4	6	7	3	8	5
Volume (gal)	2	4	5	3	3	2	3	1	2	4

3. **Comquat Computers.** Comquat owns four production plants at which personal computers are produced. Comquat can sell up to 20,000 computers per year at a price of \$3,500 per computer. For each plant the production capacity, cost per computer, and fixed cost of operating the plant for a year are given below. Determine how Comquat can maximize its yearly profit from computer production.

Plant	Production capacity	Plant fixed cost (\$ Million)	Cost per computer (\$)
1	10,000	9	1,000
2	8,000	5	1,700
3	9,000	3	2,300
4	6,000	1	2,900

4. **ABC Investments.** ABC Inc. is considering several investment options. Each option has a minimum and maximum investment allowed (only if the option is chosen). These restrictions, along with the expected return are summarized in the following table (figures are in millions of dollars):

Option	Minimum investment	Maximum investment	Expected return (%)
1	3	27	13
2	2	12	9
3	9	35	17
4	5	15	10
5	12	46	22
6	4	18	12

Because of the high-risk nature of Option 5, company policy requires that the total amount invested in Option 5 be no more than the combined amount invested in Options 2, 4 and 6. In addition, if an investment is made in Option 3, it is required that at least a minimum investment be made in Option 6. ABC has \$80 million to invest and obviously wants to maximize its total expected return on investment. Which options should ABC invest in, and how much should be invested?