

Sample Midterm Test 2

Time: 70 minutes

Instructor:

Dr. Edward Doolittle

Name: _____

Student #: _____

Section: _____

You have 70 minutes to do each of the following questions. The test is worth a total of 60 marks. Non-programmable calculators, logarithm tables, and/or slide rules are permitted; no other aids are permitted. Use the backs of the pages for rough work.

1. Copsi Cola makes two kinds of colas, regular and diet. Let x be the number of cartons of regular cola their plant produces per day, and let y be the number of cartons of diet cola their plant produces per day. It costs the company \$1.00 to produce each carton of regular and \$1.20 to produce each carton of diet. The profit the company earns is \$0.15 per carton of regular, and \$0.17 per carton of diet.
 - [2] (a) The plant can produce at most 5000 cartons of cola per day. Express that constraint as a linear inequality in x and y .
 - [3] (b) The daily operating budget is \$5400. Express that constraint as a linear inequality in x and y .
 - [5] (c) Sketch the feasible region defined by the above constraints, and find the coordinates of the corners of the feasible region.

[5] (d) How much of each type of drink should the company produce in order to maximize profit?

2. Solve the previous question with the following changes. Note: the feasible region does not change in any of the following scenarios.

[1] (a) Profit on the sale of regular cola increases to \$0.20 per carton, but profit on diet cola remains \$0.17 per carton.

[1] (b) Profit on the sale of diet cola increases to \$0.19 per carton, but profit on the sale of regular cola remains at \$0.15 per carton.

[1] (c) Profit on the sale of diet cola decreases to \$0.16 per carton, but profit on the sale of regular cola remains at \$0.15 per carton.

[2] (d) Are there any radical changes in the optimal production scheme? How might you explain those changes geometrically?

- [5] 3. Which is the better investment, 6.4% compounded annually or 6.2% compounded quarterly?
- [5] 4. Mike Holmes buys a house at a cost of \$135,000, and after three years the house is appraised at \$180,000. What was the annual rate of return earned on the house? (Assume annual compounding.)

5. The Cooper Foundation makes periodic annual contributions to a fund which will be used for building a new zoo in Saskatoon at the end of a 15 year period. The fund earns 9% interest.

[5] (a) (Ordinary annuity.) If the Cooper Foundation contributes \$25,000 per year (at the end of each year), how much is in the fund at the end of 15 years?

[5] (b) (Sinking fund.) It is estimated that the new zoo will cost \$2 million. How much should the Cooper Foundation contribute each year in order to reach that goal?

6. Alice can obtain a new car loan at 6.3% compounded monthly, with equal payments made at the end of each month for a three year period.

[5] (a) (Amortization.) If she borrows \$12,000 to buy a new car, what will be her monthly payment?

[5] (b) (Present value.) After looking over her budget, Alice decides she can afford a payment of \$425 per month. What is the maximum that Alice can borrow to keep her payments at or below that level?

- [10] 7. The Furniture Mart has two suppliers, A and B, which supply their Regina and Saskatoon stores. One month, Furniture Mart ordered 25 lamps for the Regina store and 20 for the Saskatoon store. Supplier A had 10 lamps in stock, and supplier B had 40 lamps in stock. The shipping charges from each supplier to each store are the following: A to Regina, \$5 per lamp; A to Saskatoon, \$6 per lamp; B to Regina, \$7 per lamp; B to Saskatoon, \$4 per lamp. Find the number of lamps that should be shipped from each supplier to each store in order to minimize shipping costs.