

UNIVERSITY OF NEW BRUNSWICK
DEPARTMENT OF MATHEMATICS AND STATISTICS
Winter 2004

Math 1833
Finite Mathematics for the Management Sciences

Test #2: Worth 30% of your final mark

Time: 2 hours

Mark: _____/30

Instructions:

- Show all your work. **No work, no marks!**
- Work neatly and in an organized manner.
- If you run out of space in a problem, use the space on the back of the page and clearly indicate where the solution continues.
- If you are using a formula in a problem, state it first!
- Graphing calculators are **not** allowed!
- Good Luck! 😊

Formulas:

$$F = P + P r t \quad F = (1+i)^n P \quad r_{\text{eff}} = (1+i)^m - 1 \quad F = \left[\frac{(1+i)^n - 1}{i} \right] R \quad P = \left[\frac{(1+i)^n - 1}{i(1+i)^n} \right] R$$

1. [2 marks] Find the equation of the line through $(-2, 3)$ and perpendicular to $2y + 4x = 5$. Write the equation of the line in standard form.
2. a) [1 mark] Show that the following system has no solutions.
$$3x - y = 5$$
$$6x - 2y = 3$$
b) [1 mark] What does the result in (a) tell you about the graphs of the equation in the system?
3. [3 marks] The Johnson Farm has 500 acres of land allotted for cultivating corn and wheat. The cost of cultivating corn is \$42/acre and wheat is \$30/acre. Mr. Johnson has \$18,600 available for cultivating these crops. If he wishes to use all the allotted land and his entire budget for cultivating these two crops, how many acres of each crop should he plant?

4. AutoTime, a manufacturer of 24-hr variable timers, has a monthly fixed cost of \$48,000 and a production cost of \$8 for each timer manufactured. The timers sell for \$14 each.
 - a) [3 marks] What are the cost, revenue and profit functions?
 - b) [1 mark] How many timers must AutoTime make and sell in order to break-even?
 - c) [4 marks] Find and interpret the intercepts for each equation. Sketch the cost and revenue functions on the same graph and indicate the break-even point and regions of profit and loss.
5. [2 marks] Maya paid \$10,000 for a 7-year bond issued by the city. She received interest amounting to \$3500 over the life of the bonds. What rate of (simple interest) did the bond pay?
6. [3 marks] Fleet Street Savings Bank pays interest at the rate of 4.25% per year compounded weekly in a savings account, whereas Washburn Bank pays interest at the rate of 4.125% per year compounded daily. Which bank offers a better rate of interest?
7. [3 marks] A trip to Cancun during March Break will cost \$450 and full payment is due March 1st. To have the money, a student, on September 1st, deposits \$100 in a savings account that pays 4% per annum compounded monthly. On the first of each month (starting on October 1st), the student deposits \$50 in this account. After a deposit on March 1st is made, is there enough in the account to pay for the Cancun trip? How much is in the account?
8. [5 marks] From age 25 to age 40, Jessica deposited \$200 at the end of each month into a tax-free retirement account. She made no withdrawals or further contributions until age 65. Alex made deposits of \$300 into his retirement account from age 40 to age 65. If both accounts earned interest at the rate of 5% per year compounded monthly, who ends up with a bigger amount of money at the age of 65?
9. [2 marks] Eight years ago Kim secured a bank loan of \$180,000 to help finance the purchase of a house. The mortgage was for a term of 30 years, with an annual interest rate of 9% compounded monthly. What is the outstanding balance on Kim's house?