King Fahd University of Petroleum and Minerals
Deapartment of Mathematics and Statistics
Math 105, Major Exam II Duration 120 mn

Instructor: Prof. Bilal Chanane

Name:..... ID Number:.....

Provide all the details including the formulas used!

Question	1	2	3	4	5	6	7	8	9	10	11
Max Marks	10	5	10	5	5	5	15	5	8	15	17
Marks											

Total: ...../100

Exercise 1: What effective rate is equivalent to a nominal rate of 8.5% compounded (a) monthly: (b) quarterly ?

Exercise 2: To what amount will \$10000 accummulate in 8 years if it is invested at an effective rate of 5.1% ?

Exercise 3: Which investment is better (a) 7% compounded monthly or (b) 8% continuously?

Exercise 4: Find the present value of \$20000 due after 4 years if the interest rate is 4.5% compounded quaterly?

Exercise 5: \$40000 is deposited in a savings account that earns interest at an annual rate of 7 % compounded semiannually, what is the value of the account at the end of five years?

Exercise 6: An initial investment of \$4000 grows to \$4900 in three years. Find he nominal rate of interest, compounded monthly that was earned by the money

Exercise 7: Use the simplex method to solve the linear programming problem

$$Max\ Z = 2x_1 + 3x_2$$

$$\text{subject to } \begin{cases} x_1 + x_2 \leq 100 \\ x_1 + 0.5x_2 \leq 80 \\ 0.5x_1 + x_2 \leq 70 \\ x_1, x_2 \geq 0 \end{cases}$$

Exercise 8: Find the dual of the linear programming problem appearing in Exercise 7.

Exercise 9: Model the following problem (do not solve):

A manufacturer of ski clothing makes ski pants and ski jackets. The profit on a pair of ski pants is \$8.00 and the profit on a jacket is \$4. Both pants and jackets require the work of sewing operators and cutters. There are 120 minutes of sewing operator time and 100 minutes of cutter time available. It takes 9 minutes to sew one pair of ski pants and 5 minutes to sew on jacket. Cutters take 6 minutes on pants and 9 minutes on a jacket. We are interested in maximizing the profit.

Exercise 10: Use the dual and the simplex method to solve the linear programming problem

$$\text{Minimize } W = 4y_1 + 3y_2$$

$$\text{subject to}$$

$$\begin{cases} 2y_1 + 5y_2 \geq 12 \\ 3y_1 + 2y_2 \geq 8 \\ y_1,\ y_2 \geq 0 \end{cases}$$

Exercise 11: An oil company that has two refineries needs at least 8000, 14000 and 5000 barrels of low-, medium-, and high-grade oil, respectively. Each day, Refinery I produces 2000 barrels of low-, 3000 barrels of medium-, and 1000 barrels of high-grade oil, whereas Refinery II produces 1000 barrels each of low-, and high-, and 2000 barrels of medium-grade oil. If it costs \$25000 per day to operate Refinery I and \$20000 per day to operate Refinery II, how many days should each refinery be operated to satisfy the production requirements at minimum cost? What is the minimum cost? (Assume a minimum cost exists).