King Fahd University of Petroleum & Minerals
Department of Math and Stat
Math 131 Semester 172 * Exam 2

Name_____ ID No._____ Sec. No. _____

1) An interest rate of 8% compounded semiannually corresponds to an effective rate of 1) _____
A) 9.2456% B) 8.16% C) 12% D) 8.2031% E) 8%

2) If an initial investment of $4000 grows to $5718 in six years, find the nominal rate of interest, compounded quarterly, that was earned by the money. 2) _____
A) 6.0 % B) 6.5 % C) 9.2 %. D) 12.0 % E) 5.2%

3) At an annual rate of 8% compounded continuously, in how many years would it take for a principal to double? 3) _____
A) 7.7 B) 7.3 C) 6.5 D) 9.2 E) 8.7

4) A debt of $2000 due four years from now is to be repaid by a payment of $1000 now and a second payment at the end of two years. How much should the second payment be if the interest rate is 5% compounded annually? 4) _____
A) $ 671.61 B) $ 845.23 C) $ 683.24 D) $ 711.56 E) $ 888.21

5) For an initial investment of $10,000, suppose a company guarantees the following cash flows at the end of the indicated years: 5) _____

Year	Cash Flow
1	$4000
3	$8000

Assume an interest rate of 5% compounded annually. The net present value of the cash flows is
A) $ 2000.00 B) $ 1254.67 C) $ 848.43 D) $ 639.44 E) $ 720.23

6) In five years a company will purchase equipment costing $100,000. The company decides to place a single deposit into a savings account now so that its future value will equal the cost of the equipment. If the account earns interest at an annual rate of 10% compounded continuously, determine the deposit to the nearest dollar. 6) _____
A) $ 54,234 B) $ 71,332 C) $ 60,653 D) $ 53,221 E) $40,538

7) To purchase land for an industrial site, a company agrees to pay $20,000 down and $10,000 at the end of every six-month period for 10 years. If the interest rate is 10% compounded semiannually, what is the corresponding cash value of the land? 7) _____
A) $ 144,622 B) $ 105,262 C) $ 156,550 D) $ 100,287 E) $ 120,002

8) Suppose an annuity *due* consists of 6 yearly payments of $200 and the interest rate is 5% compounded annually. Determine the future value at the end of 6 years. 8) _____
A) $ 1561.81 B) $ 1360.38 C) $ 1160.38 D) $ 1490.99 E) $ 1428.40

9) Suppose a person invests $20,000 in a business that guarantees the same cash flow at the end of every quarter for four years. If the investment earns interest at the rate of 16% compounded quarterly, then each cash flow is 9) _____
A) $ 2341.23 B) $ 1716.40 C) $ 1917.39 D) $ 916.40 E) $ 1527.52

10) Solving the problem, 10) _____

Maximize

$Z = 4x + 6y$

Subject to

$$\begin{cases} x + y \geq 3 \\ y \leq 5 \\ x \leq 4 \\ x \geq 0, y \geq 0 \end{cases}$$

the maximum value of Z is

A) 46 B) 44 C) 64 D) 56 E) 48

11) A manufacturer produces two products, product A and product B. Both products require processing on Machines I and II. The number of hours needed to produce one unit is given by the following chart: 11) _____

	Machine I	Machine II
Product A	2 hrs	3 hrs
Product B	1 hrs	4 hrs

Machine I is available for at most 1000 hours and Machine II is available for at most 2500 hours. If the profit made on product A is $20 / unit and the profit made on product B is $25 / unit. Find the maximum profit.

A) $ 17,000 B) $ 14,000 C) $ 16,625 D) $ 16,000 E) $ 15,625

12) Using the corner-point technique to maximize 12) _____

$$Z = x + 2y$$

subject to

$$y \geq x + 3$$
$$x + 2y \leq 24$$
$$x, y \geq 0.$$

the maximum value of Z occurs

A) only at the point (6,9)
B) only at the point (6,12)
C) at any point on the line segment joining (6,9) and (0,12)
D) at any point on the line segment joining (0,3) and (0,12)
E) at any point on the line segment joining (0,3) and (6,9)

13) In the initial simplex tableau below, find the pivot entry. 13) _____

	x_1	x_2	s_1	s_2	Z	
s_1	-1	2	1	0	0	8
s_2	10	6	0	1	0	12
Z	-3	-8	0	0	1	0

A) 0 B) -1 C) 10 D) 6 E) 2

14) In the initial simplex tableau below, find the departing variable. 14) _____

	x_1	x_2	s_1	s_2	Z	
s_1	-1	2	1	0	0	8
s_2	10	6	0	1	0	12
Z	-3	-8	0	0	1	0

A) x_1 B) s_2 C) s_1 D) x_2 E) Z

15) Maximize 15) _____

$$Z = x_1 - 2x_2 + 3x_3$$

subject to

$$2x_1 + x_2 + 2x_3 \le 10$$
$$x_1 - x_2 + x_3 \le 8$$
$$x_1, \quad x_2, \quad x_3 \ge 0$$

A) 15 B) 5 C) 10 D) 0 E) 20

16) The dual of 16) _____

Minimize

$$Z = x_1 + 3x_2$$

subject to

$$x_1 - 2x_2 \ge 4$$
$$3x_1 + x_2 \ge 1$$
$$x_1, x_2 \ge 0$$

is:

A) Maximize $W = y_1 + 3y_2$ subject to $y_1 - 2y_2 \le 4; 3y_1 + y_2 \le 1; y_1, y_2 \ge 0.$

B) Maximize $W = y_1 + 3y_2$ subject to $y_1 + 3y_2 \ge 4; -2y_1 + y_2 \ge 1; y_1, y_2 \ge 0.$

C) Maximize $W = 4y_1 + y_2$ subject to $y_1 + 3y_2 \le 1; -2y_1 + y_2 \le 3; y_1, y_2 \ge 0.$

D) Maximize $W = 4y_1 + y_2$ subject to $y_1 - 2y_2 \ge 1; 3y_1 + y_2 \ge 3; y_1, y_2, \ge 0.$

E) Maximize $W = 4y_1 + y_2$ subject to $y_1 + 3y_2 \ge 1; -2y_1 + y_2 \ge 3; y_1, y_2 \ge 0.$