KOÇ UNIVERSITY
MATH 101 - FINITE MATHEMATICS
Final Exam   May 29, 2013
Duration of Exam: 120 minutes

INSTRUCTIONS: CALCULATORS ARE ALLOWED FOR THIS EXAM. No books, no notes, no questions and no talking allowed. You must always **explain your answers** and **show your work** to receive **full credit**. Use the back of these pages if necessary. **Print (use CAPITAL LETTERS) and sign your name, and indicate your section below.**

Name: ———————————————————

Surname: ———————————————————

Signature: ———————————————————

Section (Check One):

Section 1: E. Şule Yazıcı T-Th-F(10:30)	——
Section 2: E. Şule Yazıcı T-Th-F(13:30)	——
Section 3: Selda Küçükcifci M-W-F(11:30)	——
Section 4: E. Şule Yazıcı T-Th-F(14:30)	——

PROBLEM	POINTS	SCORE
1	15	
2	15	
3	15	
4	20	
5	15	
6	10	
7	15	
TOTAL	**105**	

1. (15 points) Let ABC be the triangle with the angle $B = 30°$ and the sides $b = 4$, $c = 5$.

Find all possible values of the third side.

2. (15 points) Solve the following system using Gauss Jordan Elimination method. Write the solution set and determine if the system is **consistent, inconsistent, dependent or independent**.

$$\begin{cases} 2x_1 - 4x_2 + 12x_3 & = & 20 \\ -x_1 + 3x_2 + 5x_3 & = & 15 \\ 3x_1 - 7x_2 + 7x_3 & = & 5 \end{cases}$$

3. (15 points) Let

$$f(x) = \begin{cases} e^{x+2} & x > -2 \\ \log_2(x+4) & x \le -2 \end{cases}$$

Find the domain of f and sketch the graph of $f(x)$ by specifying x and y-intercepts.

A list of formulas: $I = Prt$; $A = P(1 + rt)$

$$A = P(1 + i)^n; \quad APY = (1 + \tfrac{r}{m})^m - 1; \quad A = Pe^{rt}; \quad APY = e^r - 1;$$

$$FV = PMT\frac{[(1+i)^n - 1]}{i}; \quad PV = PMT\frac{[1-(1+i)^{-n}]}{i}, \text{ where } i = \tfrac{r}{m} \text{ and } n = mt$$

4. (20 points) Esma wants to buy a house and she wants to borrow from the bank. The bank offers the following options for paying back her debt.

Option 1: Equal quarterly payments with %8 interest on the unpaid balance,

Option 2: Equal monthly payments with %7.8 interest on the unpaid balance.

(a) Which one of the payment plan should she choose to save money?

(b) If she borrows 100000 TL, how much would be each PMT if she is going to pay back her debt with the option she chose in part (a) in 2 years.

5. (15 points) Maximize the function $Z = 2x_1 + 3x_2 + 2x_3$ subject to the constraints

$$\begin{aligned}
2x_1 + x_2 + 2x_3 &\leq 13 \\
x_1 + x_2 - 3x_3 &\leq 8 \\
x_1, x_2, x_3 &\geq 0
\end{aligned}$$

6. (10 points) Poyraz runs, plays handball and swims at the athletic club. Running burns 15 calories per minute, handball 11 and swimming 7. He swims at least 30 minutes and plays handball at least 30 minutes and plays handball at least twice as long as he runs. If he has 90 minutes to exercise, how long should he participate in each activity to maximize calories burned?

Write the decision variables, appropriate equation(s) and inequalities so that this problem can be solved.

DO NOT SOLVE THE PROBLEM after you have written the equation(s) and inequalities.

7. (15 points) Consider the objective function $z = 10x_1 + 5x_2$ subject to the constraints

$$
\begin{aligned}
2x_1 + x_2 &\geq 6 \\
x_1 + 3x_2 &\geq 9 \\
x_1, x_2 &\geq 0
\end{aligned}
$$

(a) Sketch the feasible region and find the corner points.

(b) If exist, find maximum and minimum values of z and where they occur.