KFUPM – Department of Mathematics and Statistics – Term 072
MATH 131 - EXAM # 1 (Duration = 50 minutes)

NAME:_____ID:_____

Exercise 1 (20 points)
A construction company must decide whether to rent or buy a machine. The rental fee is 3000 SR per month (on a yearly basis) along with daily costs of 180 SR for each day the machine is used. The purchasing cost is 16000 SR per year along with daily costs of 230 SR for each day the machine is used. What is the maximum number of days each year that the company can use the machine to justify purchasing it rather than renting it.

Exercise 2 (20 points)
A coffee wholesaler blends together three types of coffee that sell for 2 SR, 3 SR, and 6 SR per pound, so as to obtain 100 pounds of coffee worth 3.9 SR per pound. If the wholesaler uses the same amount of the two lower priced coffees, how much of each type must be used in the blend?

Exercise 3 (20 points)
How long will it take for 500 SR to amount to 1000 SR if invested at 8% compounded quarterly? (2 decimal places)

Exercise 4 (20 points)
Use the geometric approach to minimize $\mathbf{Z = y - x}$ subject to $\mathbf{x \geq 3}$; $\mathbf{x + 3y \geq 6}$; $\mathbf{x - 3y \geq -6}$; $\mathbf{x \geq 0}$; $\mathbf{y \geq 0}$

Exercise 5 (20 points).
Using the dual and the simplex method, solve the following problem:
Minimize $Z = 6x_1 + 4x_2$ Subject to $x_1 - x_2 \geq -1$ and $x_1 + x_2 \geq 3$

Dual Problem:

Final Tableau:

Initial Tableau:

Conclusion: