Assignment #2 – *due Friday, January 24, 2020*

1. Solve the following linear programming model graphically:

$$\begin{aligned} \text{Minimize: } Z &= 8x + 6y \\ \text{Subject to: } 4x + 2y &\geq 20 \\ -6x + 4y &\leq 12 \\ x + y &\geq 6 \\ x, y &\geq 0 \end{aligned}$$

2. Gillian's Restaurant has an ice-cream counter where it sells two main products, ice cream and frozen yogurt, each in a variety of flavors. The restaurant makes one order for ice cream and yogurt each week, and the store has enough freezer spade for 115 gallons total of both products. A gallon of frozen yogurt costs \$0.75, and a gallon of ice cream costs \$0.93, and the restaurant budgets \$90 each week for these products. The manager estimates that each week the restaurant sells at least twice as much ice cream as frozen yogurt. Profit per gallon of ice cream is \$4.15 and profit per gallon of yogurt is \$3.60.
   (a) Formulate a linear programming model for this problem.
   (b) Solve this model by using graphical analysis.
   (c) Solve this model using Excel Solver (include a printout of the spreadsheet).

3. In the previous problem, how much additional profit would the restaurant realize each week if it increases its freezer capacity to accommodate 20 extra gallons total of ice cream and yogurt?

4. Starbright Coffee Shop at the Galleria Mall serves two coffee blends it brews on a daily basis, Pomona and Coastal. Each is a blend of three high-quality coffees from Colombia, Kenya, and Indonesia. The coffee shop has 6 pounds of each of these coffees available each day. Each pound of coffee will produce sixteen 16-ounce cups of coffee. The shop has enough brewing capacity to brew 30 gallons of these two coffee blends each day. Pomona is a blend of 20% Colombian, 35% Kenyan, and 45% Indonesian, whereas Coastal is a blend of 60% Colombian, 10% Kenyan, and 30% Indonesian. The shop sells 1.5 times more Pomona than Coastal each day. Pomona sells for \$2.05 per cup, and Coastal sells for \$1.85 per cup. The manager wants to know how many cups of each blend to sell each day to maximize sales.
   (a) Formulate a linear programming model for this problem.
   (b) Solve this model by using graphical analysis.
   (c) Solve this model using Excel Solver (include a printout of the spreadsheet).

5. In the previous problem:
   (a) If Starbright Coffee Shop could get 1 more pound of coffee, which one should it be? What would be the effect on sales of getting 1 more pound of this coffee? Would it benefit the shop to increase its brewing capacity from 30 gallons to 40 gallons?
   (b) If the shop spent \$20 per day on advertising that would increase the relative demand for Pomona to twice that of Coastal, should it be done?