Sample Questions for Exam 3

The following list of questions is designed to give you an idea of the difficulty level of questions that I will ask on the third midterm exam. This list is not comprehensive – there are questions I could ask that are not on here. You are responsible for all the material we have covered in this course, in class, in daily practice homework and in online quizzes. But this should serve as a guide to the level of mastery I will be looking for. This list of sample questions is slightly longer than the actual test will be.

Exam 3 will cover sections 4.3 and 6.2-6.3

You will be allowed to use a single sheet (8”x11”) of notes (both sides) and a graphing calculator during the exam. No other references will be allowed.

I will not answer further questions about what will or will not be on the exam.

1. Use the simplex method to maximize $P = 5x - 2y$ subject to the constraints:

   \[
   \begin{align*}
   2x + y & \leq 6 \\
   2x + 2y & \leq 8 \\
   x & \geq 0 \\
   y & \geq 0
   \end{align*}
   \]

2. Use the simplex method to maximize $P = 4x - y + z$ subject to the constraints:

   \[
   \begin{align*}
   2x + 3y + 3z & \leq 210 \\
   x + y + z & \leq 100 \\
   x & \geq 0 \\
   y & \geq 0 \\
   z & \geq 0
   \end{align*}
   \]

3. A coffee shop sells three blends of coffee beans: Smooth Blend, House Blend and Dark Blend. The Smooth Blend, which earns $3 profit per pound, is one-half Kona beans and one-half Columbian beans. The Dark Blend, which earns $4 profit per pound, is one-third Kona beans, one-third Columbian beans and one-third Arabian beans. The House Blend, which earns $2 profit per pound, is one-half Arabian beans, one-fourth Columbian beans and one-fourth Kona beans. The coffee shop can obtain 100 pounds of Columbian beans, 200 pounds of Arabian beans and 200 pounds of Kona beans each week. If the shop can sell all of the coffee it blends, how many pounds of each blend should the shop mix in order to maximize profit? What will the total profit be? (Hint: There will be one constraint inequality for each type of bean. Simplify each of those inequalities to remove the fractions by multiplying each inequality by an appropriate number.)
An investment of $2000 earns 6% annual interest. Find the value of the investment after 5 years if the interest is:

(a) simple
(b) compounded yearly
(c) compounded quarterly
(d) compounded monthly
(e) compounded daily

A savings account earns 9% interest, compounded monthly. What is the Annual Percentage Yield for this account? Give your answer as a percent with two decimal places (e.g. 12.29%).

A person puts $120 each month into a retirement account that earns 6% interest, compounded monthly. How much will the account be worth after 30 years?

A retirement account begins with $40,000 in it. If the account earns 3% interest, compounded monthly, how much money should the investor add to the account each month so that she can retire with $500,000 at the end of 35 years?

An investor saves $250 each month in an account that earns 9% interest, compounded monthly. How long will it take before the account is worth $200,000?