ONE Brenda has been working on a new pricing strategy for her company's ready-made salads. The analytics team has told her that they sell an average of 4000 salads per month when they price them at $5 each, and that market testing shows that monthly sales will increase by 115 per month for each 10 cent reduction in the salad price. Find analytically the salad price that Brenda should choose to bring in the greatest revenue revenue?

TWO
"LeGourmand Meals" (*LGM*) stores sell fully-prepared, restaurant-quality gourmet meals which have been cooked to perfection, and then flash-frozen at just the right moment. *LGM* customers then purchase, take home, and enjoy restaurant quality meals in the comfort of their own homes.

    LGM has 4 stores located in the towns of Arrington, Beddington, Claffington, and Debbington. These stores are supplied with meals from the three *LGM* super-kitchens: SK1, SK2, and SK3. The Arrington, Beddington, Claffington, and Debbington stores expect to sell 1100, 700, 800, and 400 meals each day. The three super-kitchens produce 1200, 820, and 1000 frozen meals per day. The costs in dollars to ship 100 frozen meals from each of the three super-kitchens to each of the four *LGM* stores are given in the table below.

	Arrington	Beddington	Claffington	Debbington
SK1	12	6	18	3
SK2	5	11	20	3
SK3	16	14	11	6

    Formulate a linear programming problem in standard form that can be used to find a shipping schedule that meets the demands with the least shipping cost.

THREE Problems involving the amount of money required to pay off a mortgage (home loan) over a fixed period of time involve the formula

$$A = \frac{P}{r}\left[1 - (1+r)^{-n}\right]$$

known as an *ordinary annuity equation*. In this equation, A is the amount of the mortgage, r is the interest rate per period (expressed as a decimal), P is the amount paid each period, and there are n payment periods. Suppose that a 30-year home mortgage in the amount of \$135,000 is needed and that the borrower can afford house payments of at most \$1000 per month.
Use Newton's method to find the maximal interest rate that the borrower can afford to pay.

For this problem, submit the following:

- a written explanatiion of the procedure to solve this problem,

- a printout of your Excel file that computes the solution, and

- an electronic version of your Excel file (details will follow).

FOUR Consider the following linear programming problem:

$$
\begin{aligned}
\text{minimize} \quad & z = -2x_1 + x_2 + 3x_3 \\
\text{subject to} \quad & 2x_1 + 5x_2 - x_3 \leq 9 \\
& x_1 + 3x_2 + 3x_3 \leq 6 \\
& x_1 + 2x_2 - 3x_3 = 3 \\
& x_2 - x_1 \geq 1 \\
& x_1, x_2, x_3 \geq 0
\end{aligned}
$$

Reformulate this problem so that it is in standard form.