This is a closed book exam. No notes are permitted. Students may use graphing calculators and laptop computers, but may not access the internet.

1. Assume that the total cost when 30 phones are made is $460 and the total cost when 35 phones are made is $510. The phones are sold for $12 each.

   (a) What is the marginal cost of production?

   (b) Find a linear cost equation that will represent the total cost of making x phones.

   (c) What is the fixed cost?

   (d) How much profit will be made if 38 phones are made and sold?

   (e) Find the break-even point.

2. (a) Graph the feasible set for the following system of inequalities:

\[
\begin{align*}
5x - 4y &\leq 88 \\
3x + 2y &\leq 88 \\
x &\geq 0 \\
y &\geq 0
\end{align*}
\]

   (b) Find the coordinates of the corner points of the feasible set.

   (c) Find the values of x and y that maximize the objective function 5x - 6y for this feasible set.

3. A publishing company has plants in Boston, Denver and Seattle. The plant in Boston makes 20 newspapers, 30 magazines and 40 books per hour. The plant in Denver makes 15 newspapers, 25 magazines and 20 books per hour. The plant in Seattle makes 50 newspapers, 40 magazines and 10 books per hour. Find how long each plant should be operated to fill an order for 855 newspapers, 915 magazines and 650 books exactly.

4. Let \( A = \begin{bmatrix} 3 & -5 \\ -4 & 20 \end{bmatrix} \) and \( B = \begin{bmatrix} 12 & -10 \\ 60 & 30 \end{bmatrix} \). Find

   (a) \( A + B \)

   (b) \( A - 4B \)

   (c) \( AB \)

   (d) \( A^{-1} \)

   (e) \( A^{-1}A \)

   (f) \( X \) if \( AX = B \).

5. Find the standard form of the equation of the line through the point (5,14) that is parallel to the line \( 4x + 8y = 160 \).