1) An interest rate of 8% compounded semiannually corresponds to an effective rate of  
A) 9.2456%  B) 8.16%  C) 12%  D) 8.2031%  E) 8%  

2) If an initial investment of $4000 grows to $5718 in six years, find the nominal rate of interest, compounded quarterly, that was earned by the money.  
A) 6.0%  B) 6.5%  C) 9.2%  D) 12.0%  E) 5.2%  

3) At an annual rate of 8% compounded continuously, in how many years would it take for a principal to double?  
A) 7.7  B) 7.3  C) 6.5  D) 9.2  E) 8.7  

4) A debt of $2000 due four years from now is to be repaid by a payment of $1000 now and a second payment at the end of two years. How much should the second payment be if the interest rate is 5% compounded annually?  
A) $671.61  B) $845.23  C) $683.24  D) $711.56  E) $888.21  

5) For an initial investment of $10,000, suppose a company guarantees the following cash flows at the end of the indicated years:  
   Year  Cash Flow  
   1  $4000  
   3  $8000  
Assume an interest rate of 5% compounded annually. The net present value of the cash flows is  
A) $2000.00  B) $1254.67  C) $848.43  D) $639.44  E) $720.23  

6) In five years a company will purchase equipment costing $100,000. The company decides to place a single deposit into a savings account now so that its future value will equal the cost of the equipment. If the account earns interest at an annual rate of 10% compounded continuously, determine the deposit to the nearest dollar.  
A) $54,234  B) $71,332  C) $60,653  D) $53,221  E) $40,538  

7) To purchase land for an industrial site, a company agrees to pay $20,000 down and $10,000 at the end of every six-month period for 10 years. If the interest rate is 10% compounded semiannually, what is the corresponding cash value of the land?  
A) $144,622  B) $105,262  C) $156,550  D) $100,287  E) $120,002  

8) Suppose an annuity due consists of 6 yearly payments of $200 and the interest rate is 5% compounded annually. Determine the future value at the end of 6 years.  
A) $1561.81  B) $1360.38  C) $1160.38  D) $1490.99  E) $1428.40  

9) Suppose a person invests $20,000 in a business that guarantees the same cash flow at the end of every quarter for four years. If the investment earns interest at the rate of 16% compounded quarterly, then each cash flow is  
A) $2341.23  B) $1716.40  C) $1917.39  D) $916.40  E) $1527.52
10) Solving the problem,

Maximize
\[ Z = 4x + 6y \]

Subject to
\[
\begin{align*}
  x + y & \geq 3 \\
  y & \leq 5 \\
  x & \leq 4 \\
  x & \geq 0, \ y & \geq 0
\end{align*}
\]

the maximum value of Z is

A) 46 \hspace{1cm} B) 44 \hspace{1cm} C) 64 \hspace{1cm} D) 56 \hspace{1cm} E) 48

11) A manufacturer produces two products, product A and product B. Both products require processing on Machines I and II. The number of hours needed to produce one unit is given by the following chart:

<table>
<thead>
<tr>
<th></th>
<th>Machine I</th>
<th>Machine II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product A</td>
<td>2 hrs</td>
<td>3 hrs</td>
</tr>
<tr>
<td>Product B</td>
<td>1 hrs</td>
<td>4 hrs</td>
</tr>
</tbody>
</table>

Machine I is available for at most 1000 hours and Machine II is available for at most 2500 hours. If the profit made on product A is $20 / unit and the profit made on product B is $25 / unit. Find the maximum profit.

A) $17,000 \hspace{1cm} B) $14,000 \hspace{1cm} C) $16,625 \hspace{1cm} D) $16,000 \hspace{1cm} E) $15,625

12) Using the corner-point technique to maximize
\[ Z = x + 2y \]

subject to
\[
\begin{align*}
  y & \geq x + 3 \\
  x + 2y & \leq 24 \\
  x, y & \geq 0
\end{align*}
\]

the maximum value of Z occurs

A) only at the point (6,9) \hspace{1cm} B) only at the point (6,12) \hspace{1cm} C) at any point on the line segment joining (6,9) and (0,12) \hspace{1cm} D) at any point on the line segment joining (0,3) and (0,12) \hspace{1cm} E) at any point on the line segment joining (0,3) and (6,9)

13) In the initial simplex tableau below, find the pivot entry.

\[
\begin{array}{cccc|c}
 x_1 & x_2 & s_1 & s_2 & Z \\
 \hline
 s_1 & -1 & 2 & 1 & 0 & 0 & 8 \\
 s_2 & 10 & 6 & 0 & 1 & 0 & 12 \\
 Z & -3 & -8 & 0 & 0 & 1 & 0 \\
\end{array}
\]

A) 0 \hspace{1cm} B) -1 \hspace{1cm} C) 10 \hspace{1cm} D) 6 \hspace{1cm} E) 2
14) In the initial simplex tableau below, find the departing variable.

\[
\begin{array}{cccc|c}
  x_1 & x_2 & s_1 & s_2 & Z \\
  s_1 & -1 & 2 & 1 & 0 & 8 \\
  s_2 & 10 & 6 & 0 & 1 & 12 \\
  Z & -3 & -8 & 0 & 1 & 0 \\
\end{array}
\]

A) \( x_1 \)  
B) \( s_2 \)  
C) \( s_1 \)  
D) \( x_2 \)  
E) \( Z \)

15) Maximize

\[
Z = x_1 - 2x_2 + 3x_3
\]

subject to

\[
\begin{align*}
2x_1 + x_2 + 2x_3 & \leq 10 \\
-x_1 + x_2 + x_3 & \leq 8 \\
x_1, x_2, x_3 & \geq 0
\end{align*}
\]

A) 15  
B) 5  
C) 10  
D) 0  
E) 20

16) The dual of

Minimize

\[
Z = x_1 + 3x_2
\]

subject to

\[
\begin{align*}
x_1 - 2x_2 & \geq 4 \\
3x_1 + x_2 & \geq 1 \\
x_1, x_2 & \geq 0
\end{align*}
\]

is:

A) Maximize \( W = y_1 + 3y_2 \) subject to \( y_1 - 2y_2 \leq 4; 3y_1 + y_2 \leq 1; y_1, y_2 \geq 0 \).

B) Maximize \( W = y_1 + 3y_2 \) subject to \( y_1 + 3y_2 \geq 4; 2y_1 + y_2 \geq 1; y_1, y_2 \geq 0 \).

C) Maximize \( W = 4y_1 + y_2 \) subject to \( y_1 + 3y_2 \leq 1; 2y_1 + y_2 \leq 3; y_1, y_2 \geq 0 \).

D) Maximize \( W = 4y_1 + y_2 \) subject to \( y_1 + 2y_2 \geq 1; 3y_1 + y_2 \geq 3; y_1, y_2 \geq 0 \).

E) Maximize \( W = 4y_1 + y_2 \) subject to \( y_1 + 3y_2 \geq 1; 2y_1 + y_2 \leq 3; y_1, y_2 \geq 0 \).