<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$37,033.15</td>
</tr>
<tr>
<td>2</td>
<td>$10,338.10</td>
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<tr>
<td>3</td>
<td>$4409.12</td>
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<tr>
<td>4</td>
<td>$111.98</td>
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<tr>
<td>5</td>
<td>$2224.24</td>
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<tr>
<td>6</td>
<td>$302.50</td>
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<tr>
<td>7</td>
<td>$5626.65</td>
</tr>
<tr>
<td>8</td>
<td>$x = -1, y = 1$</td>
</tr>
<tr>
<td>9</td>
<td>No solution</td>
</tr>
<tr>
<td>10</td>
<td>$\begin{bmatrix} 0.52 &amp; 0.88 \ 0.22 &amp; 0.41 \end{bmatrix}$</td>
</tr>
<tr>
<td>11</td>
<td>$\begin{bmatrix} 3 &amp; -1 \ -1 &amp; 2 \end{bmatrix}$</td>
</tr>
<tr>
<td>12</td>
<td>$1199.10$</td>
</tr>
<tr>
<td>13</td>
<td>$186,108.55$</td>
</tr>
<tr>
<td>14</td>
<td>$1486.08$</td>
</tr>
</tbody>
</table>
1. A newborn child receives a $10,000 gift toward a college education from her grandparents. How much will the $10,000 be worth in 20 years if it is invested at 6.6% compounded quarterly? (Round your answer to the nearest cent.)

$37,033.15

2. On Jan 1, 2006 a deposit was made into a savings account paying interest compounded quarterly. The balance on Jan 1, 2009 was $12,000.00 and the balance on April 1, 2009 was $12,150.00. How large was the deposit? (Round your answer to the nearest cent.)

$10,338.10
3. At the end of each month, $400 is deposited into a savings account paying 2.7% interest compounded monthly. The balance after 8 years will be $42,809.12. What is the amount of interest earned? (Round your answer to the nearest cent.)

$4409.12

4. Consider a $77,604 25-year mortgage at interest rate 6% compounded monthly with a $500 monthly payment. How much of the first month’s payment is applied to paying off the principal? (Round your answer to the nearest cent.)

$111.98
5. A loan of $105,495.50 is to be amortized over a 5-year term at 12% interest compounded monthly with monthly payments and a $10,000 balloon payment at the end of the term. What is the monthly payment for this loan? (Round your answer to the nearest cent.)

$2224.24

6. Using the add-on method, what is the monthly payment for a $9000 loan at 7% interest for three years? (Round your answer to the nearest cent.)

$302.50
7. Consider a 20-year mortgage of $500,000 at 6.3% interest compounded monthly where the loan is interest only for ten years. What is the monthly payment during the last ten years? (Round your answer to the nearest cent.)

$5626.65$

8. Use the Gauss-Jordan elimination method to find all solutions of the system of equations:

\[
\begin{align*}
\begin{cases}
x + 3y &= 2 \\
5x + 6y &= 1
\end{cases}
\end{align*}
\]

\[x = -1, y = 1\]
9. Use the Gauss-Jordan elimination method to find all solutions of the system of equations:

\[
\begin{align*}
    x - 5y + 6z &= -16 \\
    2x - 10y + 12z &= -34 \\
    -2x + 10y - 12z &= 34
\end{align*}
\]

No solution

10. Perform the multiplication.

\[
\begin{bmatrix}
    0.6 & 0.8 \\
    0.2 & 0.5
\end{bmatrix}
\begin{bmatrix}
    0.6 & 0.8 \\
    0.2 & 0.5
\end{bmatrix}
\]

\[
\begin{bmatrix}
    0.52 & 0.88 \\
    0.22 & 0.41
\end{bmatrix}
\]
11. Find the inverse (if it exists) of the given matrix:
\[
\begin{bmatrix}
0.4 & 0.2 \\
0.2 & 0.6
\end{bmatrix}
\begin{bmatrix}
3 & -1 \\
-1 & 2
\end{bmatrix}
\]

12. Consider a 30-year $200,000 5/1 ARM having a 2.8% margin and based on the CMT index. Suppose the interest rate is initially 6% and the value of the CMT is 5.6% five years later. Assume that all interest rates use monthly compounding. Calculate the monthly payment for the first 5 years. (Round your answer to the nearest cent.)

(Grading: 5 points total. If answer is incorrect, 1 point for each step.)

\[
i = \frac{0.06}{12} = 0.005
\]

\[
n = (12)(30) = 360
\]

\[
200,000 = \frac{1 - (1 + 0.005)^{-360}}{0.005} \cdot R
\]

$1199.10$
13. For the mortgage in Question 12, calculate the unpaid balance at the end of the first 5 years. (Round your answer to the nearest cent.)

(Grading: 5 points total. If answer is incorrect, 1 point for each step. 5 points for correct technique with incorrect inputs from Question 12.)

\[ i = \frac{0.06}{12} = 0.005 \]

\[ n = (12)(25) = 300 \]

\[ P = \frac{1 - (1 + 0.005)^{-300}}{0.005} \cdot (1199.10) \]

\[ \$186,108.55 \]

14. For the mortgage in Question 12, calculate the monthly payment for the 6th year. (Round your answer to the nearest cent.)

(Grading: 5 points total. If answer is incorrect, 1 point for each step. 5 points for correct technique with incorrect inputs from Questions 12 and 13.)

\[ r = 5.6\% + 2.8\% = 8.4\% \]

\[ i = \frac{0.084}{12} = 0.007 \]

\[ n = (12)(25) = 300 \]

\[ 186,108.55 = \frac{1 - (1 + 0.007)^{-300}}{0.007} \cdot R \]

\[ \$1486.08 \]
Potentially Helpful Formulas

\[ F = (1 + i)^n P \]

\[ P = \frac{F}{(1 + i)^n} \]

\[ r_{\text{eff}} = \text{APY} = (1 + i)^m - 1 \]

\[ F = \frac{(1 + i)^n - 1}{i} \cdot R \]

\[ P = \frac{1 - (1 + i)^{-n}}{i} \cdot R \]

\[ R = \frac{P(1 + rt)}{12t} \]