### Assignment 8

#### Question 1

A study of the effectiveness of a teaching method yielded the following data:

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>75</td>
<td>5</td>
</tr>
<tr>
<td>Old</td>
<td>70</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Question 2

The height of the learning curve can be described by the equation:

\[ h(t) = \frac{1}{1 + e^{-at}} \]

where \( h(t) \) is the fraction of the maximum output achieved at time \( t \) and \( a \) is a positive constant.

#### Question 3

A linear regression equation is obtained by minimizing the sum of the squares of the residuals. The equation can be given as:

\[ Y = aX + b \]

where \( Y \) is the dependent variable, \( X \) is the independent variable, \( a \) is the slope, and \( b \) is the intercept.

#### Question 4

A linearly independent system of equations has a unique solution. If the determinant of the coefficient matrix is non-zero, then the system has a unique solution, given by:

\[ \mathbf{X} = \mathbf{A}^{-1}\mathbf{B} \]

where \( \mathbf{A} \) is the coefficient matrix, \( \mathbf{B} \) is the constant matrix, and \( \mathbf{X} \) is the solution matrix.

#### Question 5

Some examples of 3x3 matrices are:

\[ \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix} \]

#### Question 6

A linearly independent system of equations has a unique solution. If the determinant of the coefficient matrix is non-zero, then the system has a unique solution, given by:

\[ \mathbf{X} = \mathbf{A}^{-1}\mathbf{B} \]

where \( \mathbf{A} \) is the coefficient matrix, \( \mathbf{B} \) is the constant matrix, and \( \mathbf{X} \) is the solution matrix.

#### Question 7

A linearly independent system of equations has a unique solution. If the determinant of the coefficient matrix is non-zero, then the system has a unique solution, given by:

\[ \mathbf{X} = \mathbf{A}^{-1}\mathbf{B} \]

where \( \mathbf{A} \) is the coefficient matrix, \( \mathbf{B} \) is the constant matrix, and \( \mathbf{X} \) is the solution matrix.

#### Question 8

A linearly independent system of equations has a unique solution. If the determinant of the coefficient matrix is non-zero, then the system has a unique solution, given by:

\[ \mathbf{X} = \mathbf{A}^{-1}\mathbf{B} \]

where \( \mathbf{A} \) is the coefficient matrix, \( \mathbf{B} \) is the constant matrix, and \( \mathbf{X} \) is the solution matrix.