Instructions:  
*No Late projects will be accepted*

*All projects must be inside a folder*

*All projects must be completed on separate paper and not on handouts*

*All projects must be neat and in a legible manner*

1) If Oscar’s scores for four examinations are 84, 61, 90, 88 respectively, what will be his average?

2) The following are the scores of the first examination.
38, 44, 47, 55, 55, 62, 68, 79, 81, 84, 85, 90, 97, 97, 100

Determine the median of the above list.

3) According to the results of the first examination, what is the mode of the list?

4) If only ten students have taken the final exam and their scores are:
28, 51, 66, 71, 72, 72, 78, 85, 88, 91

Find the average, the median, and the mode.

5) Suppose the instructor has decided to use letter grade to present the result of the final examination according to the following rule:

A : 100 – 91 ;  B : 90 – 81 ;  C : 80 – 71 ;  D : 70 – 60 ;  F : 59 – 0

Suggest two methods to visualize the distribution of the grades.

6) { 5, 9, 1, 14, 27, 3, 9, 18, 1, 7, 12, 27, 1, 14, 14, 13 }

Arrange (sort) the above list in ascending order. Find the mean and the modes.

7) In the summer session, Hans sells lemonade during breaks between classes. He spends $10 on supplies and charges 60 cents for each cup. Complete the following table:

<table>
<thead>
<tr>
<th>Number of Cups Sold</th>
<th>Net profit (Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>
8) Let $c$ be the number of cups sold and $p$ be the net profit. Write the equation for the above function $p(c)$, and explain what the slope is measuring in this problem.

9) Calculate the finite differences in the above table.

10) What do you notice about the finite differences? Explain

**Quadratic Model**

11) Suppose a coin is tossed into a fountain. The following graph records the path of the coin after it is released.

According to the principle of gravity, the equation for this graph is given by:

$$h(t) = -16t^2 + 25t + 4$$

Complete the following table.
12) What do you notice about the first and second finite differences?

13) Compare the above finite differences with the one from problem #9, and explain how finite differences can characterize polynomials of various degrees.

14) Recall that a quadratic function has the form:

\[ y(x) = ax^2 + bx + c \]

Find a, b, and c for the quadratic function in problem #11

**Quadratic Functions**

15) Consider the following quadratic data

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>1st F. D.</th>
<th>2nd F. D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You may verify via finite differences or by graphing the above data that this function is indeed quadratic.

16) Since the equation has the form: \( y(x) = ax^2 + bx + c \), find the vertical intercept from the table. Explain the relation between \( c \) and the vertical intercept.
17) Use the inputs and outputs in the table to obtain the numerical coefficients $a$ and $b$ for the quadratic function.

18) Write down the quadratic function then use your calculator to check if your equation yields the table in problem # 15.

19) Consider the following data: 80, 75, 90, x, y. Determine a value for x and a value for y so the data satisfy all of the following:

- Mean = 81
- Median = 80
- Mode = 75

20) If a football player kicks a ball at an angle of 35° to the ground with an initial velocity of 20 meters/second, then the height, $h$, as a function the horizontal distance traveled, $x$, is given by:

$$H(x) = 0.75x - 0.01914x^2.$$  

1) Sketch a graph of the path that the ball follows.

2) When the ball hits the ground, how far away is it from the spot where the football player kicked it?

3) What is the maximum height the ball reaches during its flight?

4) What is the horizontal distance the ball traveled when it reaches its maximum height?