Math 098 Chapter 4 - Notation Worksheet

NAME ____________________________________ DATE ___________________

1. Using the table, find $a, b, and\ c\ of\ the$ function $f(x) = ax^2 + bx + c$ and then write the function.

x	$f(x)$	$\Delta f(x)$	$\Delta\Delta f(x)$
1	4		
2	9		
3	18		
4	31		
5	48		

2. Determine the following using the function you found for number one above.
   a. Find $f(u)$
   b. Find $f(v)$
   c. Find $f(u + v)$

Math 098 Chapter 4 - Notation Worksheet

NAME ____________________________________ DATE ___________________

3. Complete the input-output table for $f(x) = ax^2 + bx + c$, where $n \epsilon\ Integers$:

<table>
<tr><th>x_n</th><th>$f(x_n)$</th><th>$\Delta f(x)_{\mathrm{n-1}}$</th><th>$\Delta\Delta f(x)$</th></tr>
<tr><td></td><td></td><td rowspan="2"></td><td></td></tr>
<tr><td></td><td></td><td rowspan="2"></td></tr>
<tr><td>x_1</td><td>$f(x_1)$</td><td rowspan="2">$\Delta f(x)_1 = f(\ x_2) - f(\ x_1\ )$</td></tr>
<tr><td></td><td></td><td rowspan="2">$\Delta\Delta f(x) = \Delta f(x)_2 - \Delta f(x)_1$</td></tr>
<tr><td>x_2</td><td>$f(x_2)$</td><td rowspan="2">$\Delta f(x)_2 = f(\ x_3\ ) - f(\ x_2\ )$</td></tr>
<tr><td></td><td></td><td rowspan="2">$\Delta\Delta f(x) = \Delta f(x)_3 - \Delta f(x)_2$</td></tr>
<tr><td></td><td>$f(x\quad)$</td><td rowspan="2">$\Delta f(x)_3 = f(\ x_4\ ) - f(\quad)$</td></tr>
<tr><td></td><td></td><td rowspan="2">$\Delta\Delta f(x) = \Delta f(x)\quad - \quad \Delta f(x)$</td></tr>
<tr><td></td><td>$f(x_4)$</td><td rowspan="2">$\Delta f(x)_4 = f(\quad) - f(\quad)$</td></tr>
<tr><td></td><td></td><td rowspan="2">…</td></tr>
<tr><td>…</td><td>…</td><td rowspan="2">…</td></tr>
<tr><td></td><td></td><td rowspan="2">$\Delta\Delta f(x) = \Delta f(x)_{\mathrm{n-1}} - \Delta f(x)_{\mathrm{n-2}}$</td></tr>
<tr><td>…</td><td>…</td><td rowspan="2">$\Delta f(\quad)_{\mathrm{n-2}} = f(\ x_{n-1}) - f(\ x\qquad)$</td></tr>
<tr><td></td><td></td></tr>
<tr><td>x_{n-1}</td><td>$f(x\qquad)$</td><td rowspan="2">$\Delta \mathrm{f}(\quad)_{\mathrm{n-1}} = \mathrm{f}(\quad) - \mathrm{f}(\quad)$</td></tr>
<tr><td></td><td></td></tr>
<tr><td>x_n</td><td>$f(x\quad)$</td></tr>
</table>

4. Answer the following, based on the results from the table in number three:

   a. $\Delta f(x)_0 = f(\quad) - f(\quad)$

   b. $\Delta f(x)_7 = f(\quad) - f(\quad)$

   c. $\Delta f(x)\qquad = f(\ \ x_{100}\ ) - f(\ x_{99}\quad)$

   d. $\Delta f(x)_m\ = f(\ x\qquad) - f(\ x\qquad)$

   e. Does $\Delta f(x)_z\ = f(\ x_{z+1}) - f(\ x_z\ \ )$?

   f. Does $\Delta f(x)_{n-42}\ = f(\ x_{n-41}) - f(\ x_{n-42}\ \ )$?

   g. Does $\Delta f(x)_{n-p}\ = f\big(\ x_{(n-p)+1}\big) - f\big(\ x_{n-p}\ \ \big)$?

   h. Does $\Delta f(x)_{n-p}\ = f\big(\ x_{n-(p-1)}\big) - f\big(\ x_{n-p}\ \ \big)$?

   i. Does $\Delta f(x)_{n+m}\ = f(\ x_{n+m}) - f(\ x_{n+m}\ \ )$?