1. The figures below show growth in a pattern of geometric figures.

![Figure 0](image1) ![Figure 1](image2) ![Figure 2](image3) ![Figure 3](image4)

a. Complete the table below to indicate the number of square tiles that would be needed for each.

<table>
<thead>
<tr>
<th>Figure Number (F)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Square Tiles (N)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Think about how the figures change as you move from one figure to the next. Write a rule using NOW and NEXT that indicates how the number of tiles changes from one figure to the next.

\[ NEXT = \text{rule} \]

c. Write a rule that indicates how the number of tiles \( N \) depends on the figure number \( F \).

\[ \text{rule} \]

d. Explain how your rule matches the pattern shown in the table.

e. i. State which variable is the independent variable and which is the dependent variable.

Independent: \( \text{rule} \)  
Dependent: \( \text{rule} \)

ii. Explain your reasoning:
2. Here are some facts about the trout in Lake Roxbury:

- There are currently 3,000 trout in the lake.
- The fish population increases at a rate of 10% per year due to births and deaths.
- Once a year, 400 fish are harvested for the local fish fry (after the lake count).

a. What is the change in the fish population the first year? Use all of the facts given.

Show reasoning:

*Change in fish population:*

b. For all of the conditions described, use the words NOW and NEXT to write a rule that shows how to use the trout population in one year to estimate the trout population in the next year.

*\( NEXT = \)___________________________________________

\[ \]

c. Find the number of fish in the lake at the end of each of the next six yearly harvests and record it in the table below. Round values to the nearest whole fish.

<table>
<thead>
<tr>
<th>Year Number</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Fish</td>
<td>3000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

d. How long will it be before there are fewer than 2000 fish in the lake?

*Explain or show your reasoning.*
3. The shelf life of milk is a function of the temperature at which the milk is stored. The following table gives the shelf life (in days) of milk stored at various temperatures (in degrees Fahrenheit).

<table>
<thead>
<tr>
<th>Storage Temperature (F)</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelf Life of Milk (d)</td>
<td>20</td>
<td>7.5</td>
<td>4.6</td>
<td>3.3</td>
<td>2.6</td>
<td>2.1</td>
</tr>
</tbody>
</table>

a. Describe how the shelf life of milk changes as the temperature changes.

b. Make a plot of how Shelf Life of Milk (d) depends on Storage Temperature (F).

[Graph]

c. Which rule below best fits the data? ______

i. \( d = F + 15 \)  
ii. \( d = 2F^2 \)  
iii. \( d = \frac{60}{F - 32} \)

d. Find, to the nearest hundredth of a day, the shelf life of milk stored at 65°F.  
   *Show or explain your reasoning.*

   Answer: __________________________

f. In order to keep milk 10 days, at what temperature should it be stored?
   *Use your calculator to solve.*

   i. What did you enter for \( y = \) ____________________

   ii. What did you use for TblStart _____ and ΔTbl ______

   iii. Show your answer in a table below:

   Answer: __________________________
4. Consider the four sketches of graphs below. Match each table or rule with the most appropriate graph. You may use a graph more than once.

Graph _________ a. \( y = ax + b \)

Graph _________ b. 

<table>
<thead>
<tr>
<th>x</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>-20</td>
<td>-30</td>
<td>-60</td>
<td>error</td>
<td>60</td>
<td>30</td>
<td>20</td>
</tr>
</tbody>
</table>

Graph _________ c. \( P = 50 - n \)

Graph _________ d. \( y = ax^2 + b \)

Graph _________ e. 

<table>
<thead>
<tr>
<th>x</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>-4</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>-4</td>
</tr>
</tbody>
</table>

Graph _________ f. \( y = a(b^r) \)

Graph _________ g. \( I = p(10 - 2p) \)

Graph _________ h. 

<table>
<thead>
<tr>
<th>x</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>-1</td>
<td>-3</td>
<td>-5</td>
<td>-7</td>
<td>-9</td>
<td>-11</td>
<td>-13</td>
</tr>
</tbody>
</table>

Graph _________ i. \( y = a/x \)

Graph _________ j. 

<table>
<thead>
<tr>
<th>x</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>.125</td>
<td>.25</td>
<td>.5</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>