Investigation for piecewise functions

1. Make a table of values for the function $y = x^2$ including the points $-3, -2, -1, 0$, and 1. Graph the function $y = x^2$ on one of the graphs, making sure to make the graph exact at the points where $x = -1$ and -2.

2. Make a table of values for the function $y = 2^x - 1$ including the points $-2, -1, 0, 1, 2$, and 3. On a second graph, graph the function $y = 2^x - 1$, making sure to make the graph exact at the points where $x = -1, 0, 1$, and 2.

3. Make a table of values for the function $y = -|x - 5|$ including the points $2, 3, 4, 5$ and 6. On a third graph, graph the function $y = -|x - 5|$, making sure to make the graph exact at the points where $x = 3, 4, 5$, and 6.

4. On the first graph, cut a vertical line through the line $x = -1$. Take the piece to the left of negative one and place onto the blank graph so that you have the graph of $y = x^2$ from $(-\infty, -1]$. Discard the right side of the graph.

5. On the second graph of $y = 2^x - 1$, cut a vertical line through the line, $x = -1$ and $x = 2$. Take the piece in the middle in between where x is -1 and 2 and place onto the blank graph so that you have the graph of $y = 2^x - 1$ from $(-1, 2)$. Discard the left and right side of the graph.

6. On the third graph of $y = -|x - 5|$, cut a vertical line through the line, $x = 2$. Take the piece to the right of 2 and place onto the blank graph so that you have the graph of $y = -|x - 5|$ from $[2, \infty)$. Discard the left side of the graph.

7. On the new graph, you have graphed the piecewise function, $y = \begin{cases} x^2 & \text{if } x \le -1 \\ 2^x - 1 & \text{if } -1 < x < 2 \\ -|x - 5| & \text{if } x \ge 2 \end{cases}$

8. On a new set of graphs, go through the same process you just did with the following piecewise function.

$$\begin{cases} x^2 + 1 & \text{if } x < 2 \\ -x + 3 & \text{if } x \ge 2 \end{cases}$$

Practice:

1. $\begin{cases} [illegible] & \text{if } x \ge -2 \\ [illegible] & \text{if } x < -2 \end{cases}$

2. $\begin{cases} x + 2 & \text{if } x \le 0 \\ 3 & \text{if } 0 < x < 4 \\ \sqrt{x} & \text{if } x \ge 4 \end{cases}$

3. $\begin{cases} (x - 1)^2 & \text{if } x \le 0 \\ x^3 - 2 & \text{if } x > 0 \end{cases}$

4. $\begin{cases} |x - 4| & \text{if } x \ge 2 \\ [illegible] & \text{if } -3 < x < 2 \\ [illegible] & \text{if } x \le -3 \end{cases}$