When Relation is Expressed...

- **As Ordered Pairs**
  - Test:
    - Each input value gives only one output (check that no x’s are repeated)

- **As a Table**
  - Test:
    - Each input value gives only one output (check that no x’s are repeated)

- **As a Graph**
  - Test:
    - Vertical Line Test
      - If a vertical line hits more than one point on graph, it is NOT a function
Tests to Determine if a Relation is a Function

Example 1:
{(0, 1), (1, 3), (2, 3), (3, 1)}
Is a function, no repeated x’s

Example 2:
{(2, 1), (3, -2), (3, 4), (4, 0)}
Not a function, x = 3 repeats

Example 3:
{(0, 3), (1, 3), (2, 3), (3, 3)}
Is a function (ok for outputs to repeat)

Example 4:
{(0, 1), (0, 2), (0, 3), (0, 4)}
Not a function, x=0 has multiple outputs

Example 1:
\[
\begin{array}{|c|c|}
\hline
x & y \\
4 & 0 \\
6 & 2 \\
8 & 2 \\
10 & 0 \\
\hline
\end{array}
\]
Is a function, no repeated inputs

Example 2:
\[
\begin{array}{|c|c|}
\hline
x & y \\
3 & 0 \\
5 & 1 \\
5 & 2 \\
7 & 3 \\
\hline
\end{array}
\]
Not a function, input of 5 gives two outputs

Example 3:
\[
\begin{array}{|c|c|}
\hline
x & y \\
1 & 3 \\
1 & 4 \\
1 & 5 \\
1 & 6 \\
\hline
\end{array}
\]
Not a function, the input is the same for all outputs

Example 1:
Is a function, passes vertical line test

Example 2:
Not a function, fails vertical line test

Example 3:
Not a function, fails vertical line test