Math 3, U1, L05, Piecewise Functions

Be able to:
• Graph and evaluate values for a piecewise function.

Know:
• Identify key characteristics of the function including: domain, range, increasing, decreasing, relative extrema, end behavior and intercepts.
• Interval notation

Learning Resources

MathIsFun.com: Piecewise Functions

CoolMath.com: Piecewise Functions

Khan Academy: Piecewise Functions: Series of eight videos
Piecewise
“Described in Pieces”

- A piecewise function describes phenomena with different equations in different parts of the domain.

Relate to absolute value functions....

\[ y = 2|x-3|-4 \]

\[ y = \begin{cases} 
2x - 10; & x \geq 3 \\
-2x + 2; & x \leq 3
\end{cases} \]
Ex. 1 Graph the piece-wise function below

\[
f(x) = \begin{cases} 
1 & \text{if } x \leq -2 \\
2 + x & \text{if } -2 < x \leq 3 \\
2x & \text{if } x > 3 
\end{cases}
\]

Domain: 
Range: 
Incr: 
Decr: 
x-int: 
y-int: 
Max(s): 
Min(s):
You try: \[ y = \begin{cases} -2x & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ x & \text{if } x > 4 \end{cases} \]

Domain: 
Range: 
Incr: 
Decr: 
x-int: 
y-int: 
Max(s): 
Min(s):

**Step Function**: a function whose graph resembles a set of stairs

**Greatest Integer Function**: a function whose output is the greatest integer that is not greater than the input. (A.K.A. Floor Function)

Notation: \( f(x) = [x] \)

Ex. \( [2] = 2 \), \( [5.4] = 5 \), \( [-3.7] = -4 \)

Graph of \( f(x) = [x] \)

\[ f(x) = [x] \text{ as a piecewise function:} \]
\[
\begin{align*}
-2 & \text{ if } -2 \leq x < -1 \\
-1 & \text{ if } -1 \leq x < 0 \\
0 & \text{ if } 0 \leq x < 1 \\
1 & \text{ if } 1 \leq x < 2 \\
2 & \text{ if } 2 \leq x < 3 \\
\text{etc.}
\end{align*}
\]

(dual slide-->
Domain:
Range:
Incr:
Decr:
x-int:
y-int:
Max(s):
Min(s):

Let's use Desmos

\[ f(x) = \begin{cases} 
2 & \text{if } x \leq -5 \\
\frac{1}{3}x + 1 & \text{if } -5 < x \leq 4 \\
-\frac{1}{2}x & \text{if } x > 4 
\end{cases} \]
Domain:
Range:
Incr:
Decr:
x-int:
y-int:
Max(s):
Min(s):

\[ f(x) = \begin{cases} 
1: x \leq -2 \\
2 + x: -2 < x \leq 3 \\
2x: x > 3 
\end{cases} \]

Domain:
Range:
Incr:
Decr:
x-int:
y-int:
Max(s):
Min(s):

\[ f(x) = \begin{cases} 
3x + 1: x \leq -1 \\
-2: -1 < x \leq 2 \\
\frac{1}{2}x - 3: x > 2 
\end{cases} \]
5. The table below shows the percentage of federal taxes taken by the government based on yearly income. Use a step function to graph the data.

<table>
<thead>
<tr>
<th>Income in thousands</th>
<th>Tax %</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 - $25,350</td>
<td>15%</td>
</tr>
<tr>
<td>$25,351 - $61,400</td>
<td>28%</td>
</tr>
<tr>
<td>$61,401 - $128,100</td>
<td>31%</td>
</tr>
<tr>
<td>$128,101 - $278,450</td>
<td>36%</td>
</tr>
<tr>
<td>Over $278,450</td>
<td>39.60%</td>
</tr>
</tbody>
</table>

Math 3 U1 L05
Homework

M3U1L05 Piecwise Activity (Blooms).pdf

M3U1L05 Piece Wise mya yael luke.pptx
Attachments

- M3U1L05 Piece Wise mya yael luke.pptx
- M3U1L05 Piecwise Activity (Blooms).pdf