1. Use the graph of $g(x)$ to answer these questions.

(c) Estimate $g'(3)$.
$$g'(3) \approx \frac{-2}{4} = -\frac{1}{2}$$

(d) Estimate $g'(2)$.
$$g'(2) \approx \frac{1}{9}$$

(e) Estimate $g'(-3)$.
$$g'(-3) \approx \frac{1.5}{4} \approx 0.375$$

(a) Where is $g(x)$ positive?
$x < -6$ and $-1 < x < 5$

(b) Where is $g(x)$ negative?
$-6 < x < -1$ and $x > 5$
2. Use the graph of $f(x)$ to fill in these blanks.

\[ f(\underline{3}) = \underline{10} \]

\[ f'(\underline{3}) = \frac{2}{3} \]

\[ M_{tan} = \frac{12 - 10}{6 - 3} = \frac{2}{3} \]
3. Use the points on the graph to answer these questions.

(a) At which points is the derivative zero?

\[ C, G, A \]  \hspace{1cm} \text{(horizontal tangent lines)}

(b) At which points is the derivative positive?

\[ B, H, I \]
(c) At which points is the derivative negative?

\[ O, E, F \]

(d) At which point is the derivative the largest?

\[ H \]

(e) At which point is the derivative the least?

\[ F \]
4. Use the table to estimate the derivatives.

<table>
<thead>
<tr>
<th>x</th>
<th>1</th>
<th>1.5</th>
<th>2</th>
<th>2.5</th>
<th>3</th>
<th>4</th>
<th>7</th>
<th>12</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>f(x)</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td>14</td>
<td>25</td>
<td>32</td>
<td>42</td>
</tr>
</tbody>
</table>

(a) \( f'(2) \approx \frac{8 - 6}{2.5 - 2} = \frac{2}{.5} = 4 \) (forwards est.)

(b) \( f'(1) = \frac{3 - 1}{1.5 - 1} = \frac{2}{.5} = 4 \)

(c) \( f'(7) = \)

\[ \text{Backwards points are closer} \]
\[ \frac{25 - 14}{7 - 4} = \frac{11}{3} \]

(d) \( f'(13) = \)

\[ \frac{42 - 32}{14 - 12} = \frac{10}{2} = 5 \]
5. Estimate the derivative for \( f(x) = x^x \) at \( x = 2 \) and at \( x = 5 \)

\[
\begin{align*}
x &= 2 & f(2) &= 4 \\
x &= 2.001 & f(2.001) &= 4.006779 \\
\end{align*}
\]

\[
\begin{align*}
f'(2) & \approx \frac{f(2.001) - f(2)}{2.001 - 2} = \frac{4.006779 - 4}{0.001} \\
&= 6.779
\end{align*}
\]

\[
\begin{align*}
x &= 5 & f(5) &= 3125 \\
x &= 5.001 & f(5.001) &= 3133.165455 \\
\end{align*}
\]

\[
\begin{align*}
f'(5) & \approx \frac{f(5.001) - f(5)}{5.001 - 5} = \frac{3133.165455 - 3125}{0.001} \\
&= \frac{8.165455}{0.001} = 8165.455
\end{align*}
\]