1.13 Removing Discontinuities

Calculus

1. Let \( f \) be the function defined by

\[
f(x) = \begin{cases} 
\frac{x^2-10x+21}{x-3}, & x \neq 3 \\
\frac{x^2-81}{x-9}, & x = 3 
\end{cases}
\]

For what value of \( a \) is \( f \) continuous at \( x = 3 \)?

2. Let \( f \) be the function defined by

\[
f(x) = \begin{cases} 
\frac{x^2-5x}{x}, & x \neq 0 \\
b, & x = 0 
\end{cases}
\]

For what value of \( b \) is \( f \) continuous at \( x = 0 \)?

3. If the function \( f \) is continuous for all real numbers and if \( f(x) = \frac{x^2-81}{x-9} \) when \( x \neq 9 \), then \( f(9) = \)

4. Let \( f \) be the function defined by

\[
f(x) = \begin{cases} 
\frac{x^2+12x+20}{c(x+2)}, & x \neq -2 \\
c, & x = -2 
\end{cases}
\]

For what value of \( c \) is \( f \) continuous at \( x = -2 \)?

5. Let \( f \) be the function defined by

\[
f(x) = \begin{cases} 
\frac{\sin(4x)}{5x}, & x \neq 0 \\
\frac{\sin(4x)}{5}, & x = 0 
\end{cases}
\]

For what value of \( a \) is \( f \) continuous at \( x = 0 \)?

6. If the function \( f \) is continuous for all real numbers and if \( f(x) = \frac{x^2-15x+56}{x-7} \) when \( x \neq 7 \), then \( f(7) = \)
<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>( a = -4 )</td>
<td>2.</td>
<td>( b = -5 )</td>
<td>3.</td>
<td>18</td>
</tr>
<tr>
<td>4.</td>
<td>( c = \pm \sqrt{8} )</td>
<td>5.</td>
<td>( a = \frac{4}{5} )</td>
<td>6.</td>
<td>-1</td>
</tr>
</tbody>
</table>