Math 251 Graded Lab # 2

Activity 2.1
Create tables similar to Tables 2.1.3 and 2.1.4 from which you can deduce each of the following limit values. Make sure that you include table numbers, table captions, and meaningful column headings. Make sure that your input values follow patterns similar to those used in Tables 2.1.3 and 2.1.4. Make sure that you round your output values in such a way that a clear and compelling pattern in the output is clearly demonstrated by your stated values. Make sure that you state the limit value!

You must use radians.

19. \[ \lim_{x \to -1^+} \frac{\sin(x + 1)}{3x + 3} \]

Use \[ f(x) = \frac{\sin(x+1)}{3x + 3} \]

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.9</td>
<td>0.33278</td>
</tr>
<tr>
<td>-0.99</td>
<td>0.333278</td>
</tr>
<tr>
<td>-0.999</td>
<td>0.333328</td>
</tr>
<tr>
<td>-0.9999</td>
<td>0.33333328</td>
</tr>
</tbody>
</table>

From the values in Table 19 the limit value is

\[ \lim_{x \to -1^+} \frac{\sin(x+1)}{3x + 3} = \frac{1}{3} \]
Activity 2.3
Use the limit laws to establish the value of the following limit after first manipulating the expression so that it no longer has form \( \frac{0}{0} \). Make sure that you use the step-by-step, vertical format shown in examples 2.3.1 and 2.3.2. Make sure that you cite each limit law used.

2. \( \lim_{x \to 4} \frac{x + 4}{2x^2 + 5x - 12} \)

\[ = \lim_{x \to 4} \frac{(x + 4)}{(2x - 3)(x + 4)} \]

\[ = \lim_{x \to 4} \frac{1}{2x - 3} \]

\[ = \frac{1}{2 \lim_{x \to 4} x - \lim_{x \to 4} 3} \]

\[ = \frac{1}{2(4) - 3} \]

\[ = \frac{1}{5} \]

\[ = \frac{-1}{11} \]
Use the limit laws to establish the value of the following limit after first manipulating the expression so that it no longer has form $\frac{0}{0}$. Make sure that you use the step-by-step, vertical format shown in examples 2.3.1 and 2.3.2. Make sure that you cite each limit law used.

5. \[\lim_{t \to 0} \frac{\cos(2t) - 1}{\cos(t) - 1}\]

\[= \lim_{t \to 0} \frac{2\cos^2(t) - 1 - 1}{\cos(t) - 1}\]

\[= \lim_{t \to 0} \frac{2\cos^2(t) - 2}{\cos(t) - 1}\]

\[= \lim_{t \to 0} \frac{2(\cos^2(t) - 1)}{\cos(t) - 1}\]

\[= \lim_{t \to 0} \frac{2(\cos(t) - 1)(\cos(t) + 1)}{(\cos(t) - 1)}\]

\[= \lim_{t \to 0} \frac{2(\cos(t) + 1)}{1}\]

\[= 2 \lim_{t \to 0} (\cos(t) + 1)\]

\[= 2(\cos(0) + 1)\]

\[= 4\]