To earn full credit on any given problem your work must be presented in a manner consistent with that demonstrated and discussed during both lecture and lab. Remember to show your algebraic steps one step at a time.

1. Evaluate \( \lim_{t \to \infty} \frac{4t^2 + 7t^3}{3 - 4t^3} \). (12 points)

To earn full credit your work must include all relevant limit law steps accompanied by a statement of the limit law number(s) used in each of those steps (as shown in class).
2. Evaluate \( \lim_{x \to 3} \frac{4x^3 - 12x^2}{x^2 + x - 12} \). (15 points)

To earn full credit your work must include all relevant limit law steps accompanied by a statement of the limit law number(s) used in each of those steps (as shown in class).
3. Evaluate \( g'(2) = \lim_{h \to 0} \frac{g(2 + h) - g(2)}{h} \) for the function \( g(x) = \frac{9}{x + 1} \). (14 points)

For this problem you do not need to show the limit law steps (although you may if you like). To earn full credit, however, you do need to show all of the relevant algebra up until the point you could begin working through the limit law steps and, of course, you must continue until you state the value of the limit.
4. State the three properties that must be true about the function \( f \) at the number \( a \) if \( f \) is continuous at \( a \). Refer to these properties by number when answering question 5. (6 points)

1. 
2. 
3. 

5. State each value of \( t \) where the function \( g \) shown in Figure 1 is discontinuous. For each discontinuity, state (by number) each of the properties that you stated in problem 4 that fails at that value of \( t \). Please note that you will not get full credit for this question if your answer to question 4 is not 100% correct. (12 points)

6. For each given statement circle T if the statement is true and circle F if the statement is false. This question refers to the function \( g \) shown in Figure 1. (6 points total)

<table>
<thead>
<tr>
<th>T or F</th>
<th>( g ) is continuous from the right at (-4).</th>
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<tbody>
<tr>
<td>T or F</td>
<td>( g ) is continuous from the right at (1).</td>
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<tr>
<td>T or F</td>
<td>The discontinuity on ( g ) at (2) is removable.</td>
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<td>T or F</td>
<td>The discontinuity on ( g ) at (3) is removable.</td>
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<tr>
<td>T or F</td>
<td>The discontinuity on ( g ) at (5) is removable.</td>
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<tr>
<td>T or F</td>
<td>( g ) is continuous on ((-\infty, -4]).</td>
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<td>T or F</td>
<td>( g ) is continuous on ((1, 2)).</td>
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<tr>
<td>T or F</td>
<td>( g ) is continuous on ([3, 5)).</td>
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7. Sketch onto Figure 2 one function, \( y = f(x) \), that satisfies each of the properties stated below. Assume that there are no intercepts or discontinuities other than those directly implied by the given properties. Make sure that your graph has all of the labels discussed and exemplified in lecture and lab. No work other than the graph need be shown. (12 points)

- \( \lim_{x \to -\infty} f(x) = \lim_{x \to \infty} f(x) = 3 \)
- \( \lim_{x \to -4} f(x) = -2 \)
- \( \lim_{x \to 4} f(x) = 5 \)
- \( \lim_{x \to 3^-} f(x) = -\infty \)
- \( \lim_{x \to 3^+} f(x) = \infty \)
- \( f(-2) = 0 \)
- \( f(0) = -1 \)
- \( f(-4) = 5 \)

8. Complete Table 1 with values from which you can infer \( \lim_{t \to \infty} \left[ t \ln \left( \frac{8 + \frac{2}{t}}{\frac{8}{t}} \right) \right] \). Make sure that you add to the table all of the documentation discussed and exemplified in lecture and lab. Make sure that you state an appropriate conclusion about the limit being investigated. (11 points)

Table 1:

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9. For each given statement circle T if the statement is true and circle F if the statement is false. Please note that by "true" we mean the statement is always true. (12 points total)

Please note that I am not trying to play mind games with you. For example, if you were asked whether or not it is true that \( \lim_{x \to 0^+} \frac{1}{x} = \infty \), the correct answer would be "true" because, gosh darn it, that's just a thing that it's O.K. to write.

T or F \( \lim_{x \to 0^+} \frac{1}{x} \) exists

T or F \( \lim_{x \to \infty} \frac{1}{x} \) exists

T or F \( \lim_{x \to 0^+} \frac{1}{x} = \lim_{x \to 0^+} 1 \) exists

T or F \( \lim_{x \to \infty} \frac{1}{x} = \lim_{x \to \infty} 1 \) exists

T or F \( \lim_{\theta \to \infty} \sin(\theta) \) exists

T or F \( \lim_{\theta \to \infty} \frac{\sin(\theta)}{\theta} \) exists

T or F \( \lim_{t \to 2} \frac{t-2}{t-2} \) exists

T or F \( \lim_{t \to 2} \frac{t-2}{t-2} = \frac{\lim_{t \to 2} (t-2)}{\lim_{t \to 2} (t-2)} \) exists

T or F \( \lim_{t \to -\infty} \frac{t-2}{t-2} \) exists

T or F \( \lim_{t \to -\infty} \frac{t-2}{t-2} = \frac{\lim_{t \to -\infty} (t-2)}{\lim_{t \to -\infty} (t-2)} \) exists

T or F \( \lim_{t \to -2} \frac{t-2}{t-2} \) exists

T or F \( \lim_{t \to -2} \frac{t-2}{t-2} = \frac{\lim_{t \to -2} (t-2)}{\lim_{t \to -2} (t-2)} \) exists

T or F \( \frac{6h}{h} = 6 \)

T or F \( \lim_{h \to 0} \frac{6h}{h} = \lim_{h \to 0} 6 \)

T or F \( \lim_{x \to \infty} x = \infty \)

T or F \( \lim_{x \to \infty} \frac{1}{x} = \frac{1}{\infty} \)