(1) Evaluate the limit.
   
   (a) \( \lim_{x \to 0} \frac{5x^4 - 3x^2 + 2x + 3}{9x^2 - 4} \)
   
   (b) \( \lim_{x \to 4} \frac{x^2 + x - 20}{x^2 - 7x + 12} \)
   
   (c) \( \lim_{x \to 1} \frac{x^2 - x - 2}{x + 1} \)
(d) \( \lim_{x \to -4^-} \frac{|x + 4|}{x + 4} \)

(e) \( \lim_{x \to -1^-} \frac{x - 2}{x + 1} \)
(f) \( \lim_{t \to 0} \frac{\sqrt{2 - t} - \sqrt{2}}{t} \)
(2) Evaluate the following

(a) \( \lim_{x \to \infty} \frac{2e^{-x} + 3 - 5e^{4x}}{3e^{4x}} \)

(b) \( \lim_{x \to \infty} \frac{90x^2 - 3}{10x + \pi^4} \)

(c) \( \lim_{x \to \infty} \frac{8x^3 + 5}{2x^4 - 3x^2 + 1} \)

(d) \( \lim_{x \to -\infty} \frac{2x^2 + 1}{4x^2 - 7x + 5} \)
(3) Determine where the function \( f(x) = \frac{\sqrt{x^2 - 1} + \sqrt{x + 5}}{\sqrt{8 - 9x - 2}} \) is continuous.
(4) Consider the function \( f(x) \) below and answer the following questions.

\[
 f(x) = \begin{cases} 
 x + 5 & x \leq -4 \\
 \frac{x^2 - x - 30}{9(x+4)/(8-x)} & -4 < x < 18 \\
 \frac{10\sqrt{x^2 - 17(e^{x^2}+64)}}{\sqrt{x+12}} & x > 18 \\
 \log_3(25 - x) & x > 18 
\end{cases}
\]

(a) Find \( \lim_{x \to -5} f(x) \), if it exists.

(b) Find \( \lim_{x \to 24} f(x) \), if it exists.

(c) Find \( \lim_{x \to -4^+} f(x) \), if it exists.

(d) Where is \( f(x) \) continuous?
(5) The following table gives some values of a continuous function, \( f(x) \). Use the information to

<table>
<thead>
<tr>
<th>( x )</th>
<th>(-2.1)</th>
<th>(-2.01)</th>
<th>(-2.001)</th>
<th>(-2)</th>
<th>(-1.999)</th>
<th>(-1.99)</th>
<th>(-1.9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>25.4400</td>
<td>23.6904</td>
<td>23.5190</td>
<td>23.5</td>
<td>23.4810</td>
<td>23.3104</td>
<td>21.6400</td>
</tr>
</tbody>
</table>

(a) Find \( \lim_{x \to -2} f(x) \), if it exists.

(b) Find the average rate of change on the interval \([-2.1, -2]\).

(c) Estimate the instantaneous rate of change at \( x = -2 \).
(6) Find the average rate of change of \( f(x) = x^2 + 6 \) from \( x = -3 \) to \( x = 1 \).

(7) Given \( f(x) = \begin{cases} x - 4a & \text{if } x < -2 \\ ax^2 & \text{if } x \geq -2 \end{cases} \). Find the value of \( a \) which makes the function continuous everywhere.
(8) Find the vertical asymptote(s) and hole(s) of \( f(x) = \frac{(x - 1)(x + 3)}{x^2 - 1} \).
(9) Find \( f'(x) \) using the limit definition of the derivative for \( f(x) = 3x^2 - 4 \).

(10) Using the result above, find the equation of the tangent line to the graph of \( f(x) = 3x^2 - 4 \) at \( x = 2 \).
(11) Find $f'(x)$ using the limit definition of the derivative for $f(x) = \sqrt{3x+1}$.

(12) Using the result above, find the equation of the tangent line to the graph of $f(x) = \sqrt{3x+1}$ at $x = 1$. 
(13) Find $f'(x)$ using the limit definition of the derivative for $f(x) = \frac{-2}{x+2}$.

(14) Using the result above, find the equation of the tangent line to the graph of $f(x) = \frac{-2}{x+2}$ at $x = 0$. 
(15) The price-demand equation of a store that sells \( x \) gourmet blenders per month at a price of \( p \) dollars per blender is given by \( p = 876(0.9985)^x \).

(a) Find the average rate of change of price when production increases from 800 blenders to 900 blenders each month, and interpret your answer.

(b) Find the rate of change of revenue at a production level of 850 blenders, and interpret your answer.
(16) A company that makes cameras has a cost function given by $C(x)$, where $x$ is the number of cameras made and $C(x)$ is the total cost of producing $x$ cameras (in dollars). Use the following information to help you answer the questions below

<table>
<thead>
<tr>
<th></th>
<th>$C(21)$</th>
<th>$C''(21)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C(21)$</td>
<td>$1494.43$</td>
<td>$22.36$</td>
</tr>
<tr>
<td>$C(22)$</td>
<td>$1516.52$</td>
<td>$21.82$</td>
</tr>
<tr>
<td>$C(23)$</td>
<td>$1538.08$</td>
<td>$21.32$</td>
</tr>
<tr>
<td>$C(24)$</td>
<td>$1559.17$</td>
<td>$20.85$</td>
</tr>
</tbody>
</table>

(a) Find the exact cost of the 23rd camera.
(b) Approximate/estimate the cost of the 23rd camera.
(c) Find the rate of change of cost when 22 cameras are produced.
(d) Find the exact cost if 24 cameras are produced.
(e) Approximate/estimate the cost if 24 cameras are produced.
(f) Find the marginal cost if 21 cameras are produced, and interpret your answer.