Instructions.

1. Attempt all questions.

2. Show all the steps of your work clearly.

3. You may use a calculator, if needed.

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Q1] [20 points] Compute the following limits:

a) \( \lim_{x \to 3} \frac{x^2 - 9}{x^2 - 5x + 6} \)

b) \( \lim_{x \to 4} \frac{\sqrt{x} - 2}{x - 4} \)
Q2] . . . [20 points]

a) Write the three conditions for a function \( y = f(x) \) to be continuous at a point \( x = a \):

i)

ii)

iii)

b) Using the three conditions above, determine whether the following function is continuous at the point \( x = 1 \).

\[
f(x) = \begin{cases} 
  x^2 + 3x - 1, & x < 1 \\
  3, & x = 1 \\
  \sqrt{x + 8}, & x > 1 
\end{cases}
\]
Q3]...[20 points]

a) Write the limit definition of the derivative for the function \( y = f(x) \)

b) Compute \( f'(x) \) using the definition given above for the function \( y = 2x^2 - 3x + 7 \)
Q4]...[20 points] Find all points on the graph of \( f(x) = \frac{2}{3}x^{3/2} - x + 1 \) with tangent lines to the graph of \( f \) parallel to the line \( 3y - 6x = 7 \).
Compute the following derivatives:

a) \( y = x^2(3x + 4)^5 \)

b) \( y = \left(\frac{x+2}{1-x}\right)^{-3} \)
Scratch