MATH 31 - Calculus. Quiz 1. 02/13/2025. Professor Luis Fernández

SOLUTION

Find the following limits:

1. $\lim_{x \to -2} (3x - 7)$

$\lim_{x \to -2} (3x - 7) = 3(-2) - 7 = -13$

2. $\lim_{x \to -3} \frac{x^2 + 3x}{x^2 - x - 12}$

Evaluate first and see that you get $\frac{0}{0}$, which is indeterminate, which means that we have to do some work and "cancel out the zeros".

$$\lim_{x \to -3} \frac{x^2 + 3x}{x^2 - x - 12} = \lim_{x \to -3} \frac{x(x+3)}{(x+3)(x-4)} = \lim_{x \to -3} \frac{x}{x-4} = \frac{-4}{-8} = \frac{-3}{-7} = \frac{3}{7}$$

3. $\lim_{x \to 9} \frac{9 - x}{3 - \sqrt{x}}$

Evaluate first and see that you get $\frac{0}{0}$, which is indeterminate, which means that we have to do some work and "cancel out the zeros". In this case, multiply and divide by the conjugate.

$$\lim_{x \to 9} \frac{9 - x}{3 - \sqrt{x}} = \lim_{x \to 9} \frac{(9 - x)(3 + \sqrt{x})}{(3 - \sqrt{x})(3 + \sqrt{x})} = \lim_{x \to 9} \frac{(9 - x)(3 + \sqrt{x})}{9 - x} = \lim_{x \to 9} (3 + \sqrt{x}) = 3 + 3 = 6.$$

4. $\lim_{t \to 0} \left(\frac{1}{t} - \frac{1}{t^2 + t} \right)$

Evaluate first and see that you get $\infty - \infty$, which is indeterminate, which means that we have to do some work and "cancel out the infinities". In this case, write it with a common denominator.

$$\lim_{t \to 0} \left(\frac{1}{t} - \frac{1}{t^2 + t} \right) = \lim_{t \to 0} \left(\frac{(t+1) - 1}{t(t+1)} \right) = \lim_{t \to 0} \left(\frac{t}{t(t+1)} \right) = \lim_{t \to 0} \left(\frac{1}{t+1} \right) = \frac{1}{0+1} = 1.$$