Lecture 10

Tuesday, September 17, 2024 10:35 PM

We will consider some limits of the indefinite form $\frac{0}{0}$. This is a tricky situation because you can't plug the number in (the function is not continuous). However, there are tricks to help find such limits.

Example 1:

$\lim_{x\to 1} \frac{1-x}{2-3x+x^2}$

We will try to factor the denominator.

Example 2:

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

We will multiply the numerator and the denominator by the conjugate of the denominator, which is $3+\sqrt{x}$.

Example 3:

$\lim_{t\to 0} \frac{\sqrt{1+t}-\sqrt{1-t}}{t}$

We will multiply the numerator and the denominator by the conjugate of the numerator, which is $\sqrt{1+t}+\sqrt{1-t}$.

Squeeze theorem: If $f(x) \le g(x) \le h(x)$ for all x near a and $\lim_{x\to a} f(x) = \lim_{x\to a} h(x) = L$ then $\lim_{x\to a} g(x) = L$.

Squeeze theorem is a very neat tool. It helps transform a complicated limit problem into a simpler limit problem.

Example 4:

$\lim_{x\to 0} x \sin\left(\frac{x^2+1}{x}\right)$