

# 13 Lecture - MTH101

## Important Subjective

**What is the definition of the sine function?**

**Answer:** The sine function is defined as the y-coordinate of a point on the unit circle in the coordinate plane.

**Is the limit of the sine function as x approaches zero defined? Why or why not?**

**Answer:** No, the limit of the sine function as x approaches zero is not defined because the function oscillates between -1 and 1 as x approaches zero.

**What is the limit of the cosine function as x approaches zero?**

**Answer:** The limit of the cosine function as x approaches zero is 1.

**What is the definition of continuity?**

**Answer:** A function is said to be continuous at a point if the limit of the function at that point exists and is equal to the value of the function at that point.

**Is the tangent function continuous at all points? Why or why not?**

**Answer:** No, the tangent function is not continuous at certain points where it has vertical asymptotes.

**What is the derivative of the sine function?**

**Answer:** The derivative of the sine function is the cosine function.

**What is the derivative of the cosine function?**

**Answer:** The derivative of the cosine function is the negative sine function.

**What is the derivative of the tangent function?**

**Answer:** The derivative of the tangent function is the secant squared function.

**How can the continuity of trigonometric functions be used to solve problems in calculus?**

**Answer:** The continuity of trigonometric functions can be used to find critical points and solve optimization problems.

**What is the maximum value of the function  $f(x) = \sin(x) + \cos(x)$  on the interval  $[0, 2\pi]$ ?**

**Answer:** The maximum value of the function  $f(x) = \sin(x) + \cos(x)$  on the interval  $[0, 2\pi]$  is  $\sqrt{2}$ , which occurs at  $x = \pi/4$  and  $5\pi/4$ .