



Bilkent University

Quiz # 02
Math 101-Section 12 Calculus I
11 October 2020 Sunday
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Solution Key

Q-1) Write an equation for the tangent line to the curve $y = \sin\left(\tan\left(\frac{x^3 - 1}{x^2 + 1}\right)\right)$ at $x = 1$.

Solution: We first calculate y' using the chain rule:

$$y' = \cos\left(\tan\left(\frac{x^3 - 1}{x^2 + 1}\right)\right) \cdot \sec^2\left(\frac{x^3 - 1}{x^2 + 1}\right) \cdot \frac{(3x^2)(x^2 + 1) - (x^3 - 1)(2x)}{(x^2 + 1)^2}.$$

We now put $x = 1$ and find $y'(1) = 3/2$.

Next put $x = 1$ in the expression of y to find $y(1) = 0$.

Hence an equation of the tangent line to this curve at the point $(1, 0)$ is

$$y = \frac{3}{2}(x - 1).$$

Here is a graph of the function with its tangent at $(1, 0)$ for your information, not required as part of this quiz.

