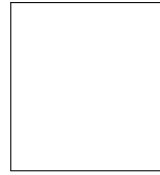




Bilkent University

Quiz # 05
Math 101 Section 01 Calculus I
4 November 2025, Tuesday
Instructor: Ali Sinan Sertöz



Name & Lastname:

Department:

Student ID:

Q-1) The following questions all involve an application of Rolle's Theorem or the Mean Value Theorem. You are expected to explain clearly, in well formed sentences, how the solutions are reached using these theorems.

- (a) Let f be a function differentiable everywhere. Assume that $f'(x)$ is never equal to 1. Show that there is **at most** one point x_0 such that $f(x_0) = x_0$.
- (b) Let $f(x) = x^4 + 32x + c$, where c is a constant. Show that no matter which c is chosen, $f(x) = 0$ has **at most** two real roots.
- (c) A car leaves Ankara in the morning destined to İstanbul. At the same time an intercity bus leaves İstanbul destined to Ankara, following the same highway. The drivers are instructed to drive non-stop but at any speed they like at any given time. That evening they both arrive their intended destinations at the same time. Show that sometime during the day both drivers were driving their vehicles at the same speed.

Grading: 3+3+4=10 points

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Solution: