

Section:

Name & Surname: SAMPLE KEY

Math 119 Fall 2019-2020

Quiz no.: 05

Date: 06.12.19

Time Limit: ~10 Minutes

ID Number: Fundamental Theorem
of
Calculus.

Grade:

1. Let $F(x) = \int_1^{x^2} g(t) dt$ where $g(t) = \int_2^{t^3} \cos(\sin u) du$. Calculate $F'(x)$ and $F''(x)$.

By FTC;

$$F'(x) = g(x^2) \cdot 2x = \left(\int_2^{x^6} \cos(\sin u) \cdot du \right) 2x$$

$$F''(x) = \frac{d}{dx} \cdot (g(x^2)) \cdot 2x + 2 \cdot g(x^2)$$

$$\frac{d}{dx} (g(x^2)) = \frac{d}{dx} \int_2^{x^6} \cos(\sin u) \cdot du \stackrel{\text{FTC}}{=} \cos(\sin x^6) \cdot 6x^5$$

$$\therefore F''(x) = \cos(\sin x^6) \cdot 6x^5 \cdot 2x + 2 \cdot \int_2^{x^6} \cos(\sin u) \cdot du$$