

Quiz No. 1
Sections 1202, 1203
01/31/19

1. (5 pts.) Use the First Fundamental Theorem of Calculus to find the derivative of the following function.

$$f(x) = \int_0^{x^5} \sin \theta d\theta$$

Let $F(\theta)$ be an anti-derivative of $\sin \theta$.

$$\text{Then } F'(\theta) = \sin \theta.$$

$$f(x) = F(x^5) - F(0)$$

$$f'(x) = F'(x^5) \cdot 5x^4 - 0$$

$$= 5x^4 \cdot \sin(x^5)$$

2. (5 pts.) Evaluate the indefinite integral.

$$\text{Let } u(x) = 1 - e^x$$

$$du = -e^x dx$$

$$dx = -\frac{1}{e^x} du$$

$$\int \frac{e^x}{(1 - e^x)^2} dx$$

$$= \int \frac{e^x}{u^2} \cdot \left(-\frac{1}{e^x}\right) du$$

$$= -\int u^{-2} du$$

$$= -(-u^{-1}) + C$$

$$= \frac{1}{1 - e^x} + C$$