

Engineering Calculus I - MAC 2281 - Section 002

QUIZ IX

First Name:

Last Name:

1. (4 points)

State the Fundamental Theorem of Calculus (both parts).

If f is continuous on $[a, b]$ then

Part 1: $\frac{d}{dx} \left[\int_a^x f(t) dt \right] = f(x)$

Part 2: $\int_a^b f(x) dx = F(b) - F(a)$ where $F'(x) = f(x)$

2. (6 points)

For the following exercises, show sufficient work to communicate your process.

(a) Compute $\int \left(-8x + 2e^x + \frac{1}{x}\right) dx$.

$$\begin{aligned}\int \left(-8x + 2e^x + \frac{1}{x}\right) dx &= -8 \int x dx + 2 \int e^x dx + \int \frac{1}{x} dx \\ &= -8 \cdot \frac{x^2}{2} + 2e^x + \ln|x| + C \\ &= -4x^2 + 2e^x + \ln|x| + C\end{aligned}$$

(b) Compute $\int_{-\pi}^{\pi} (\cos(y) + 1) dy$.

$$\begin{aligned}\int_{-\pi}^{\pi} (\cos(y) + 1) dy &= \left[\sin(y) + y\right]_{-\pi}^{\pi} \\ &= \left(\sin(\pi) + \pi\right) - \left(\sin(-\pi) - \pi\right) \\ &= \left(0 + \pi\right) - \left(0 - \pi\right) \\ &= \pi - (-\pi) = \pi + \pi = 2\pi\end{aligned}$$