Quiz 0

(1) Evaluate \( \frac{d}{dx} e^{x^2} \).

(Chain Rule)

\[ 2xe^{x^2} \]

(2) Evaluate \( \frac{d}{dx} \int_0^z \cos^2 u \, du \).

(Fundamental Theorem of Calculus)

\[ 2 \cos x \]

(3) Evaluate \( \lim_{x \to \infty} \frac{e^x}{x^n} \).

(\text{L'Hopital's Rule})

(4) On what intervals is the function \( f(x) = x^3 - 2x^2 + x \) concave up?

\[ f'(x) = 3x^2 - 4x + 1 \]
\[ f''(x) = 6x - 4 \]
\[ f''(x) \geq 0 \quad \text{for} \quad x \geq \frac{2}{3} \]

(5) State the Mean Value Theorem.

For \( f(x) \) continuous and differentiable on \([a, b]\), there is a \( c \in (a, b) \) such that

\[ f(c) = \frac{f(b) - f(a)}{b - a} \]