Quiz 2

(1) Write the Taylor series up to 3rd order

10 (a) $f(x) = \ln x, \quad a = 1$

10 (b) $f(x) = \sqrt{x}, \quad a = 1$

10 (2) $f(x) = \begin{cases} 0 & x = 0 \\ e^{-\frac{1}{|x|}} & x \neq 0 \end{cases}$

True or False

$$f(x) = \sum_{n=0}^{\infty} \frac{f^{(n)}(0)\, x^n}{n!} x^n \Rightarrow x = 0$$

10 (3) Show that the MacLaurin series generated by $(1+x)^{\frac{1}{3}}$ converges for $|x| < 1$

10 (4) Write a_0, a_1, a_2 for the Taylor series expansion of $y(x)$

$$\begin{cases} \frac{dy}{dx} = y + y^2 \\ y(0) = 2 \end{cases}$$

10 (5) (*) $\begin{cases} x(t) = \cos t \\ y(t) = 2 + \sin t \end{cases}$ $\quad \underline{\underline{0 \le t \le \pi}}$

Give <u>formulas (only)</u> for (a) arclength of (*)

(b) A_σ (x-axis)

10 (6) $r = f(\theta) \quad \alpha \le \theta \le \beta$

Derive formula of arclength

(7) 10 (x, y, z) 10 (r, θ, z) 10 (ρ, ϕ, θ)

(a) $(1, 1, 1)$

(b) $(1, \pi/3, 1)$

(c) $(\sqrt{3}, \pi/3, -\frac{\pi}{2})$