

銘傳大學 96 學年度轉學生招生考試

生物醫學工程學系、電子工程學系

7 月 25 日 第三節

微積分試題

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(限用答案本作答)

可使用計算機

不可使用計算機

1. Please calculate the following integral; (20 pt.)

$$\int_0^1 \frac{1}{9x^4 - 16} dx$$

2. Please calculate the following Jacobian coefficients between (X, Y, Z) coordination and Spherical Coordination (r, θ , ϕ).

(a) $J = \left| \frac{\partial(X, Y, Z)}{\partial(r, \theta, \phi)} \right|$ (10 pt.)

(b) $J = \left| \frac{\partial(r, \theta, \phi)}{\partial(X, Y, Z)} \right|$ (10 pt.)

3. Assuming the function of f(x);

$$f(x) = e^{x^2}$$

(a) find out the Taylor's series at x=0 and it's series presentation (10 pt.)

(b) based on the answer of (a) and find out it's Radius of Convergence (R.O.C.) (5 pt.)

(c) based on the answer of (a) and find out it's interval of convergence. (5 pt.)

4. Please prove that the volume (V) and surface area (A) of a sphere with radius R equal to (20 pt.)

$$V = \frac{4}{3}\pi R^3 \quad \text{and} \quad A = 4\pi R^2$$

5. Please calculate the following integral; (20 pt.)

$$\int \frac{x^3}{x^3 + x^2 - 2} dx$$

試題完