

科目：微積分 適用：應化系二

編號：343

考生注意：1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 試題隨卷繳回。

本 試 題
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Calculus

1. (10%) For $f(x) = c e^{-4x}$, find c so that $f(x)$ is a probability density function on the interval $[0, b]$ for $b > 0$. What happens to c as $b \rightarrow \infty$?
2. (20%) Evaluate the following integrals:
 - (a) $\int \frac{e^{1/x}}{x^2} dx$
 - (b) $\int \frac{x+1}{x^2+2x-1} dx$
3. (20%) Evaluate the following integrals:
 - (a) $\int_0^{\pi/4} \tan^4 x \sec^4 x dx$
 - (b) $\int \cot^3 x \csc^3 x dx$
4. (20%) Determine whether the integral converges or diverges. Find the value of the integral if it converges.
 - (a) $\int_0^{\infty} x e^x dx$
 - (b) $\int_0^{\infty} \frac{1}{(x-2)^2} dx$
5. (15%) Find the equations of the tangent plane and the normal line to $z = 6 - x^2 - y^2$ at the point $(1, 2, 1)$.
6. (15%) Find the area inside the curve defined by $r = 2 - 2\sin \theta$.