注意：考試開始鈴響前，不可以翻閱試題

台灣聯合大學系統107學年度學士班轉學考試題

考試科目：微積分

參考用

組別：A2

—作答注意事項—

1. 作答中如發現試題印刷不清，得舉手請監試人員處理，但不得要求解釋題意。
2. 請核對答案卷（卡）上之准考證號、考試科目是否正確。
3. 本考科禁止使用計算器。
4. 請在答案卷(作答區內)作答。
5. **考生限在作答區內作答，不可書寫姓名、准考證號或與作答無關之其他文字或符號。**
6. 答案卷用盡不得要求增加。
7. 答案卷限用藍筆或黑色鋼筆、原子筆或鉛筆書寫；答案卡限用2B軟心鉛筆畫記，如畫記不清（含未依範例畫記）致光學閱讀機無法辨識答案者，其後果考生自行負責。
8. 因字跡潦草或作答未標明題號等情事，致評閱人員無法辨識答案者，該部分不予計分。

科目 微積分 類組別 A2 共2頁 第1頁

甲、填充題：共 8 題，每題 8 分，共 64 分。請在答案卷上列出題號依序作答。

請注意：本（甲）部分，共 8 題，命題型態為填充題，必須以填充題形式將答案寫在答案卷第一頁，倘若答案被包含在演算過程中，將被視為試算草稿，無法採計計分。

1. Determine the limits of integration where $a \leq b$ such that $\int_a^b (x^2 - 16)\,dx$ has minimal value. Answer :_____

2. Evaluate $\int_0^{\pi/2} \sqrt{1 - \sin x}\,dx$.

3. Evaluate the integral $\iint_R \sqrt{3 - x^2 - y^2}\,dA$, where $R = \{(x, y) | x^2 + y^2 \leq 3\}$. Answer :_____

4 Find the interval of convergence of the power series $\sum_{n=0}^{\infty} \frac{2n(x-3)^n}{(n+1)!}$. Answer :_____

5 Find the volume of the solid bounded above by the surface $z = f(x, y)$ and below by the plane region R, where $f(x, y) = \ln x$ and R is bounded by the graphs $y = 2x$ and $y = 0$ from $x = 1$ to $x = 3$. Answer :_____

6 Let $z = f(x, y) = \ln(xy)^{1/2}$. Find the approximate change in z when the point changes from $(5, 10)$ to $(5.03, 9.96)$. Answer :_____

7. Consider a differential equation $\frac{dy}{dt} = \frac{k}{v}(10 - y)$, $y(0) = y_0$, where k, v and y_0 are positive constants with $y < 10$. Find $\lim_{t \to \infty} y$. Answer :_____

8 Find the minimum of the function $f(x, y, z) = xy + 2yz + 2xz$ subject to the constraint $xyz = 108$. Answer :_____

乙、計算、證明題：共 3 大題，每大題 12 分，共 36 分。須詳細寫出計算及證明過程，否則不予計分。

1. An airplane is flying on a flight path that will take it directly over a radar tracking station. The distance s is decreasing at a rate of 640 kilometers per hour when $s = 16$ km. What is the speed of the plane?

2. Determine if the given series converges or diverges. Explain your reasoning.

a. (6 分) $\sum_{n=1}^{\infty} \frac{e^{2/n}}{n^2}$ b. (6 分) $\sum_{n=1}^{\infty} \frac{n}{\sqrt{3n^2 + 5}}$

參考用

注意:背面有試題

3. Consider the function $f(x,y) = \begin{cases} ke^{-(x+y)/a}, & \text{if } x \geq 0,\ y \geq 0 \\ 0, & \text{elsewhere.} \end{cases}$

Find the relationship between the positive constants a and k such that f is a joint probability density function of the continuous random variables x and y.