

國立臺北大學 114 學年度日間學士班轉學生招生考試試題

學制系級：統計學系日間學士班 2、3 年級

科目：微積分

第1頁 共1頁

可 不可 使用計算機

1. Evaluate the following integrals. (30% , 10% each)

(a) $\int \ln\left(\frac{x}{x+1}\right) dx$ (b) $\int_1^3 \frac{3}{x^2-3x} dx$ (c) $\int x^n \ln x dx, n \neq -1$

2. If the rate of growth is proportional to both the quantity y and the difference between the quantity and the limit L , then it follows the law of the logistic growth model. (25%)

(b) Write down the *differential equation*. (5%)

(c) Solve it to derive the general form of the logistic growth model. (10%)

(d) The proportion of U.S. households that own a cell phone relates to the year, with a limit of 0.95. Let $t = 0$ represent 2000, $t = 1$ represent 2001, and so on. If the proportion of U.S. households that own a cell phone in 2000 is 23.75%, and in 2005 the proportion is 59.16%, find a logistic growth model for this data. (10%)

3. Analyze the graph of this model $f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}}, -\infty \leq x \leq \infty$, for inflection points. (25%)

4. Find the volume of the solid region bounded in the first octant by the plane $z = 2 - x - 2y$. (20%)

試題隨卷繳交