

國立臺北大學 113 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) $\int \frac{xe^{2x}}{(2x+1)^2} dx$ (b) $\int_1^3 \frac{3}{x^2-3x} dx$ (c) $\int_{-\infty}^{\infty} (x-u) \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-u)^2}{2\sigma^2}} dx$

2. Evaluate the double integral $\int_0^1 \int_{y/2}^{1/2} e^{-x^2} dx dy$. Note that it is necessary to change the order of integration. (20%)

3. A conservation organization releases 100 animals of an endangered species into a game preserve. During the first 2 years, the population increases to 103 animals. The organization believes that the preserve has a capacity of 200 animals and that the herd will grow according to a logistic growth model. That is, model assumes that the rate of growth is proportional to both the quantity y and the difference between the quantity and the limit L . (30%)

(a) Write a differential equation where the size y of the herd will follow the equation and t is measured in years. (10%)

(b) Then derive this logistic curve, find / solve for the constant of integration and the proportionality constant. (10%)

(c) How long will it take to establish a population of 150? (10%)

4. Find an equation of the tangent line to the graph of the function given below at the given point, $x=0$, and

$f(x) = \left(\frac{x+5}{x-1} \right) (2x+1)$. (20%)

試題隨卷繳交