

國立臺灣師範大學 97 學年度學士班二年級轉學生招生考試試題

科目：微積分

適用學系(組)：資訊工程學系

注意：1. 本試題共 1 頁，請依序作答，並標明題號，不必抄題。

2. 答案必須寫在答案卷上之指定作答區內，否則依規定予以扣分。

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1. Evaluate the following integrals.

(a)  $\int_{-\infty}^{\infty} (x-3)^2 \frac{1}{6\sqrt{2\pi}} e^{-\frac{(x-3)^2}{36}} dx$  (15 分)

(b)  $\int \frac{x}{1-\sec x^2} dx$  (15 分)

2. Evaluate the limit of the following expression. (15 分)

$$\lim_{x \rightarrow \infty} x \sin \frac{1}{x}$$

3. Find the sum of the following series. (15 分)

$$\sum_{n=1}^{\infty} \frac{10}{1-4n^2}$$

4. Find the 3<sup>th</sup> Taylor polynomial (centered at 1) of the function  $f(x) = \ln(x+1)$ . (10 分)

5. Find the equation of a plane that is perpendicular to the plane  $2x - 3y + z = 3$  and passes through  $(-1, 1, -1)$  and  $(2, 2, 1)$ . (10 分)

6. Find the maxima and minima of the function  $f(x, y) = x^2 + 3xy + y^2$  subject to the constraint  $x^2 + y^2 \leq 1$ . (20 分)