國立臺灣師範大學96學年度學士班二年級轉學生招生考試試題

學系(組)：資訊工程學系

專門科目：微積分

注意事項：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。

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1. Evaluate the limits in the following problems.

(a) $\lim_{x\to 0}\dfrac{\sin(2x)-2\sin x}{-2e^{x}+2+2x+x^{2}}$ (15 分)

(b) $\lim_{x\to\infty}\left(\sqrt{x+4x^{2}}-2x\right)$ (15 分)

2. Evaluate the following integrals.

(a) $\int\dfrac{6}{x^{3}-4x^{2}+3x}dx$ (15 分)

(a) $\int\dfrac{2}{\sqrt{e^{2x}-1}}dx$ (15 分)

3. Find the maximum and minimum values of the function shown below and the corresponding values of x on the given interval.

$f(x)=x-\sqrt{1-x^{2}}$, x in [-1,1] (20 分)

4. Find the sum of the following series:

$\sum_{k=1}^{\infty}\dfrac{2^{k}-3^{k}}{4^{k}}$ (10 分)

5. Find the equation of the plane that contains the line of intersection of the planes $x+y+z=0$ and $2x+y-3z=2$, and passes through point $(2,0,1)$. (10 分)