淡江大學104學年度日間部轉學生招生考試試題

系別: 運管系、統計系二年級　　科目: 微積分

考試日期:7月25日 (星期六) 第1節　　本試題共 7 大題, 1 頁

注意事項: (1) 請按題號順序作答, 並註明題號。(2) 可用鉛筆。(3) 不可使用計算機。(4) 需要計算過程。

1. (10%) (a) Find the limit $\lim_{x\to 1}\dfrac{x^2-1}{|x-1|}$ if it exists. (b) If $\lim_{x\to -2}\dfrac{f(x)}{x^2}=1$, find $\lim_{x\to -2}\dfrac{f(x)}{x}$.

2. (20%) (a) Find $f'(x)$ if $f(x)=\dfrac{1+\ln x}{1-\ln x}$. (b) Find dy/dx: $\sqrt{x+y}=1+x^2y^2$.

3. (15%) Determine where the function $f(x)=\dfrac{x^2}{x^2+3}$ is increasing and decreasing, and where its graph is concave up and concave down. Find the relative extrema, inflection points and asymptotes. Sketch the graph of the function.

4. (20%) Find the integral. (a) $\int \ln x\, dx$. (b) $\int \dfrac{1}{x^2}\left(\dfrac{1}{x}-1\right)^{2/3} dx$.

5. (10分) Determine whether the integral $\int_{-\infty}^{\infty} xe^{-2x^2}\, dx$ is convergent or divergent. Evaluate it if it is convergent.

6. (10%) Find the average value of $f(x,y)=xy$ over the given region D, where D is the triangle with vertices $(0,0)$, $(1,0)$ and $(1,3)$.

7. (15%) Find the maximum and minimum values of $f(x,y)=e^{xy}$ subject to $x^2+y^2=4$.