淡江大學 105 學年度進修學士班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　　5-1

考試日期：7 月 21 日(星期四) 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) 不可使用計算機; (3) 需要計算過程.

1. (10%) Find the indicated limits if it exists: (a) $\lim_{x\to\infty} \dfrac{x^2+x-5}{1-2x-x^3}$, (b) $\lim_{x\to 5^+} \dfrac{\sqrt{2x-1}-3}{x-5}$

2. (20 %) Find dy/dx if (a) $(x-2y)^2 = y$, (b) $y = \dfrac{e^x+x}{\ln x}$

3. (15%) Determine where the function $f(x) = \dfrac{x}{(x+1)^2}$ is increasing or decreasing, and where its graph is concave up and concave down. Find the relative extrema, inflection points and asymptotes. Sketch the graph of function.

4. (20%) Find the indicaed integral: (a) $\int \dfrac{e^x+e^{-x}}{e^x-e^{-x}}dx$ (b) $\int_1^{e^2} x\ln x^{1/3}dx$

5. (10%) Determine whether the integral $\int_{-\infty}^{\infty} \dfrac{x}{(x^2+1)^{3/2}}\,dx$ is convergent or divergent. Evaluate the integral if it converges.

6. (10%) Find the area of R, where R is the region bounded by $y = \ln x$, $y = x$, $y = 0$, and $y = 1$.

7. (15%) Find all critical points and determine whether each corresponds to a relative maximum, a relative minimum, or a saddle point for the function $f(x,y) = x\ln(y^2/x) + 3x - xy^2$.