淡江大學 108 學年度日間部轉學生招生考試試題

系別：數學學系三年級　　科目：微積分

考試日期：7 月 24 日(星期三) 第 2 節　　本試題共 10 大題，1 頁

Partial credit—You must show all your work.

1. (10 points) Find $\lim_{x\to\sqrt{5}} \dfrac{x^2-5}{x-\sqrt{5}}$.

2. (10 points) Find $\lim_{x\to 0} \dfrac{x\tan(3x)}{\sin^2(\pi x)}$.

3. (10 points) Find $\dfrac{dy}{dx}$ if $y = \dfrac{x^2+x+1}{x+2}$.

4. (10 points) Determine convergence or divergence for the series $\sum_{n=1}^{\infty} \dfrac{1}{n(n+1)}$

5. (10 points) Find all critical points and all the local maxima, local minima, and saddle points of the function $f(x,y) = x^3 - y^3 - 2xy + 6$.

6. (10 points) Find the points on the ellipse $x^2 + 2y^2 = 1$ where $f(x,y) = xy$ has its extreme values.

7. (10 points) Let R be the region in the xy-plane bounded by $y = -x^2$ and the line $x = y + 2$. Find the area of R.

8. (10 points) Evaluate the integral $\int_0^1 t^3(1+t^4)^3\,dt$

9. (10 points) Find the line that is tangen to the curve $x^2y^2 = 9$ at $(-1,3)$.

10. (10 points) Find the volume of the solid D bound by the sphere $x^2+y^2+z^2 = 9$ and and the cone $z = \sqrt{x^2+y^2}$.