國立嘉義大學 113 學年度

應用數學系碩士班(甲組)招生考試試題

科目: 微積分（每題 10 分，共 100 分）

1. $\int \frac{x^2+1}{(x-1)(x-2)^2} dx$=?

2. $\frac{d}{dx}\left\{\log_2 \sqrt{\frac{(x^2+1)(x^3+3)}{x^4+5}}\right\}$=?

3. $\lim\limits_{x\to 0} \frac{\sqrt{1+2x}-\sqrt[3]{1-3x}}{x+x^2}$=?

4. $\lim\limits_{y\to 0} \frac{\cos(y)-1}{y}$=?

5. $\int_0^2 \{[x^2]-[x]^2\}dx$=? where [ ] is the greatest integer function.

6. $\lim\limits_{x\to 0^+} x^x$ =?

7. Find a power series for $f(x) = \tan^{-1}(x)$ centered at 0.

8. Find the arc length of the graph of $r = 1 + \cos\theta,\ 0 \le \theta \le 2\pi$.

9. Let $f(x) = e^{|x-1|}$. Is f differentiable at $x = 1$?

10. Let $f(x) = \sqrt{x + \sqrt{x + \sqrt{x}}}$. Then $f'(x)$ =?