國立政治大學 101 學年度碩士班招生考試試題

考試科目	微積分	所別	4183 風險管理與保險（精算組）	考試時間	2月26日(日) 第一節

1. (20 分) Suppose f anf g are two functions with derivatives. Prove that

$$\frac{d}{dt}(f(t)g(t)) = \frac{d}{dt}f(t) \cdot g(t) + f(t) \cdot \frac{d}{dt}g(t)$$

2. (30 分)

(a) Let n be a positive integer, compute

$$\lim_{\theta \to 0} \frac{1 - \cos(n\theta)}{\theta^2}$$

(b) Let $x > 1/3$ be a constant and $\log(\cdot)$ denote the natural logarithm, compute

$$\lim_{\theta \to 0} \frac{\log(3x + 5\theta) - \log(3x)}{\theta}$$

(c) Compute

$$\lim_{\theta \to 0^+} \theta^{3\theta}$$

3. (20 分) Compute

(a)

$$\int_0^1 \frac{1}{\sqrt{x}} dx$$

(b)

$$\int_0^1 \frac{1}{x\sqrt{x}} dx$$

4. (30 分) Let $f(t) = \exp(-t^2/2)$ and θ is a real number. Compute

(a)

$$A = \int_0^\infty f(t)dt$$

(b)

$$g(\theta) = \int_{-\infty}^\infty \exp(\theta t) f(t) dt$$

(c)

$$\frac{d^2}{d\theta^2} g(\theta)|_{\theta=0}$$

備註	試題隨卷繳交