

國立中山大學 107 學年度碩士暨碩士專班招生考試試題

科目名稱：微積分【應數系碩士班乙組】

題號：424002

※本科目依簡章規定「不可以」使用計算機(問答申論題)

共 1 頁第 1 頁

計算題：共 7 題，子題分數平均分配。答題時，每題都必須寫下題號與詳細步驟。

[1]. (10%) Let $F(x) = 2^x + \frac{1}{\sqrt{x^2+1}} + \int_0^x \cos(\pi s^2) ds$. Find $F'(x)$ and $F''(x)$.

[2]. (16%)

(a) Find the Taylor series of $f(x) = \sin(x)$ at $x = \frac{\pi}{2}$.

(b) Evaluate $\lim_{x \rightarrow 0} \frac{x^3 - \sin x^3}{x^9}$

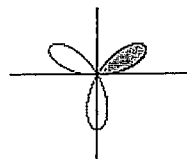
[3]. (20%) Evaluate the following integrals.

(a) $\int_0^\pi e^x \cos x dx$

(b) $\int_{-\infty}^{\infty} \frac{1}{x^2 + 2x + 5} dx$

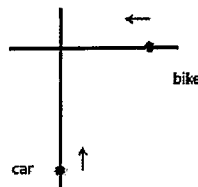
[4]. (14%) Find the interval of convergence for the power series $\sum_{n=1}^{\infty} \frac{3^n}{n} (5x - 1)^n$.

[5]. (12%) Find the area of one leaf of the three-leaf rose $r = \sin 3\theta$.



[6]. (14%) Evaluate the iterated integral $\int_0^{\sqrt{\pi}} \int_y^{\sqrt{\pi}} \sin(x^2) dx dy$.

[7]. (14%) A bike is traveling west at 20 km/h and a car is traveling north at 80 km/h. Both are headed for the intersection of the two roads. At what rate are the bike and the car approaching each other when bike is 30 m and car is 40 m from the intersection?



===== 全卷完 =====

試題隨卷繳回