

國立高雄大學 105 學年度研究所碩士班招生考試試題

科目：微積分
考試時間：100 分鐘

系所：統計學研究所(統計組)
本科原始成績：100 分

是否使用計算機：否

1. Find the area of the region bounded by the following curves:

(a) (10%) $y^2 = x + 3, \quad x - 2y = 0$

(b) (10%) $y = \sin(x), \quad y = \cos(x), \quad x = \pi/4$ and $x = 5\pi/4$

2. Find the Taylor polynomial of the following functions f for the given centered at a and the degree of n :

(a) (10%) $f(x) = \cos(x); \quad a = \pi/3, \quad n = 4$

(b) (10%) $f(x) = e^{x/2}; \quad a = 0, \quad n = 5.$

3. Find the following limits:

(a) (10%) $\lim_{n \rightarrow \infty} \left(1 - \frac{x}{5n}\right)^{2n}$

(b) (10%) $\lim_{x \rightarrow 0^+} \sqrt{x} \ln x$

4. (10%) Determine whether $\sum \frac{2k + 5}{5k^3 + 3k^2}$ convergence or divergence.

5. Find the second derivative of the following function:

(a) (10%) $f(x) = \sqrt[4]{2x^2 + 1}$

(b) (10%) $f(x) = x^2 \sin(3x)$

6. (10%) Evaluate the integral $\int_0^{\infty} (x^6 e^{-2x} + \frac{x}{3} e^{-x/4}) dx.$