

東吳大學 106 學年度轉學生(含進修學士班轉學生)招生考試試題

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系級	巨量資料管理學院學士學位學程二年級	考試時間	100 分鐘
科目	微積分	本科總分	100分

1. (10%) Find the limits.

(a) (5%) $\lim_{x \rightarrow -2^+} x \frac{|x+2|}{x+2}$

(b) (5%) $\lim_{x \rightarrow 0} \frac{\sin 2x}{3x}$

2. (10%) Find the derivatives of the functions.

(a) (5%) $f(x) = (2\cos x + 5)(3x^2 + 2x + 1)$

(b) (5%) $f(x) = \frac{x^2}{(x-1)^3}$

3. (10%) Show that $f(x) = x^3$ satisfies the hypothesis of the Mean Value Theorem on $[-1, 1]$.

4. (10%) Find $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$ by using integration by substitution.

5. (10%) Find the area of the region under the graph of $f(x) = 4 - x^2$ on the interval $[-1, 2]$.

6. (10%) Find the volume of the solid obtained by revolving the region bounded by $y = \sqrt{x}$ and $y = x$ about the y -axis.

7. (10%) Find $\int x \sec x^2 dx$.

8. (10%) Evaluate the limit using l'Hopital's Rule

$$\lim_{x \rightarrow \infty} (x^2 + e^x)^{1/x}$$

9. (10%) Show that $\left\{ \frac{100^n}{n!} \right\}$ is convergent.

10. (10%) Differentiate the functions.

(a) (5%) $g(x) = \frac{2^x}{\sqrt{3^x+1}}$ (b) (5%) $y = x^{x^2}$