

東吳大學 104 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	財務工程與精算數學系三年級	考試時間	100 分鐘
科目	微積分	本科總分	100 分

10% each. Justify your calculation in the process. Answers without proper justification will not be graded.

- Find the limit $\lim_{n \rightarrow \infty} \frac{1}{\sqrt{n}} \sum_{k=1}^n \frac{1}{\sqrt{k}}$.
- Find the sum $\sum_{n=1}^{\infty} \frac{n(1/2)^n}{(n+1)!}$.
- $f(x) = \exp(x)$, $g(x) = \int_0^{x^2+x} \frac{1}{1+t^4} dt$ and $h(x) = f(g(x))$. Find $h'(0)$.
- $f(x) = x^x$, $x > 0$. Prove that f has minimum value.
- Evaluate $\int_0^1 \int_{2y}^2 \exp(x^2) dx dy$.
- $P(x)$ is a polynomial of degree 3, and its graph intersects the x -axis at $x = a, b, c$. Find the point of inflection of $P(x)$.
- $f(x) = \frac{1}{(x+1)(x^2+1)}$, find $f^{(100)}(0)$.
- Find the maximum and minimum of $f(x, y) = 2x^3 + y^4$ on the set $\{(x, y) \mid x^2 + y^2 \leq 1\}$.
- Find the values of p, q for which the integral $\int_a^b \frac{(b-x)^q}{(x-a)^p} dx$ converges.
- Prove that $x^p - 1 \geq p(x - 1)$ for $p > 1, x > 0$.