

國立臺灣海洋大學 106學年度研究所碩士班招生考試試題

考試科目：微積分

系所名稱：運輸科學系碩士班不分組

1. 答案以橫式由左至右書寫。2. 請依題號順序作答。

For problem 1-10, each counts 10 points.

1. Find $f(x-1)$ if $f(x) = 3x^2 + \frac{1}{x} + 5$.
2. Find $\lim_{x \rightarrow 1} \frac{\sqrt{x} - 1}{x - 1}$.
3. Show that the polynomial $p(x) = 2x^3 - x + 5$ is continuous at $x = 1$.
4. After x weeks, the number of people using a new rapid transit system was approximately $N(x) = 6x^3 + 500x + 8000$. At what rate was the use of the system changing with respect to time after 8 weeks.
5. Differentiate the quotient $Q(x) = \frac{x^2 - 5x + 7}{2x}$ by using the quotient rule.
6. Determine the critical numbers of $f(x) = 324x - 72x^2 + 4x^3$ and classify each critical point as a relative maximum, a relative minimum, or neither.
7. Show that the equation $x^2 + 2x - 1 = x^{\frac{1}{3}}$ must have at least one solution on the interval $0 \leq x \leq 1$.
8. Differentiate the function $y = x^x$.
9. $\int (2e^u + \frac{6}{u} + \ln 2) du$.
10. $\int (\ln x)^2 dx$.