

國立臺灣海洋大學 103 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

1. 答案以橫式由左至右書寫。2. 請依題號順序作答。

1. (10%) Prove the limit statement $\lim_{x \rightarrow 1} \frac{1}{x} = 1$
2. (10%) Find $\frac{dy}{dx}$ if $xy = \cot(xy)$
3. (10%) Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ if $f(x, y) = \log_y x$
4. (10%) Using the definition, calculate the derivative of the function $p(\theta) = \sqrt{3\theta}$
5. (10%) Evaluate $\int_0^{\pi/2} \theta^2 \sin 2\theta \, d\theta$
6. (15%) Find the points on the curve $xy^2 = 54$ nearest the origin.
7. (15%) Sketch the region of integration, reverse the order of integration and evaluate the integral
$$\iint_R (y - 2x^2) \, dA$$
 where R is the region bounded by the square $|x| + |y| = 1$
8. (20%) Sketch a graph of the function $f(x) = x^4 - 4x^3 + 10$