

所別：產業經濟研究所碩士班 甲組 科目：微積分

可選擇以英文或中文作答。

1. (20%) What is implicit function theorem. Provide an example for the application of implicit function theorem.
2. (20%) Solve the differential equation $\frac{dy}{dt} + Ry = Ty^m$, where R and T are two functions of t , and m is any number other than 0 and 1.
3. (20%) Find the extreme value(s) of $z = -x_1^3 + 3x_1x_3 + 2x_2 - x_2^2 - 3x_3^2$.
4. (20%) Show that under the constraint $u - 2v = 0$, the quadratic form $q = 4u^2 + 4uv + 3v^2$ is always positive.
5. (20%) Prove "If $f(x)$ is a concave function, then for any constant k , the set $S = \{x \mid f(x) \geq k\}$ is convex; but the converse is not true."