

臺灣大學數學系

九十二學年度博士班入學考試題

幾何

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1. $r = 1 + \cos \theta$ is a cardioid. At the point $(r, \theta) = (2, 0)$ K =curvature=? (25/100)
2. $\frac{x^2}{9} + \frac{y^2}{4} + \frac{z^2}{1} = 1$ is an ellipsoid. At the point $(x, y, z) = (3, 0, 0)$ K =Gauss curvature=? (25/100)
3. $\{x^2 + y^2 = 1 | x, y \in \mathbb{R}\}$ is a circle. Is it simply connected ? (25/100)
4. 2×2 matrices $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ with determinant $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = 1$ form a subset of \mathbb{R}^4 . Is it a compact subset ? (25/100)

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