

淡江大學 109 學年度日間部轉學生招生考試試題

系別：物理系三年級

科目：電磁學

24 - 1

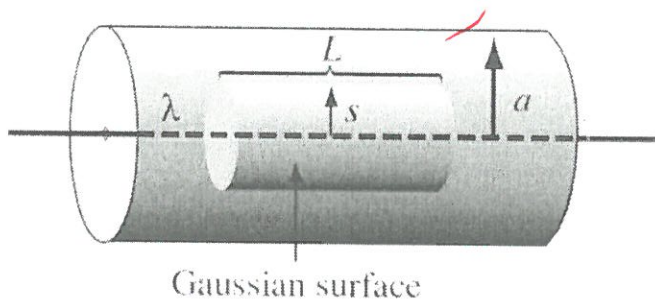
考試日期：7 月 22 日(星期三) 第 1 節

本試題共 四 大題， 1 頁

1. Given two vectors $\vec{A} = 2\hat{x} + \hat{y} + 3\hat{z}$ and $\vec{B} = \hat{x} - 3\hat{y} + 2\hat{z}$.

Find (a) the unit vector of \vec{A} and \vec{B} (10 %) (b) the dot product of \vec{A} and \vec{B} (5 %); (c) the cross product of \vec{A} and \vec{B} (5 %) and (d) the acute angle between the two vectors by using the dot product (5 %) and the cross product (5 %).

2. A long straight wire, carrying uniform line charge λ , is surrounded by rubber insulation out to a radius a . Find the electric displacement. (20%)



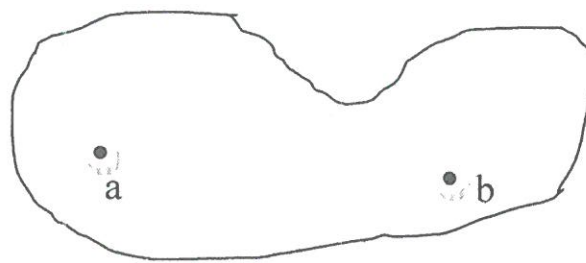
3. Please write down the basic electrostatic properties of ideal conductors

(a) $\vec{E} = ?$ inside a conductor (5 %)

(b) $\rho = ?$ inside a conductor (5 %)

(c) if a and b are any two points within (or at the surface of) a given conductor, please write down the relation between V_a and V_b . (5 %)

(d) please draw \vec{E} just outside a conductor. (5 %)



4. 一心臟外科醫生以一台電磁流量計(如下圖)來監控動脈中血液的流動，電極 A 與 B 是接觸在血管外層的表面，其內部的直徑為 3.00 mm。(a)對於磁場強度為 0.040 0 T，電極間的電動勢為 160 μ V，計算血流的速度為何？(b)證實如圖示中，電極 A 是正的，電動勢的符號主要是依據血流中移動離子的正電荷還是負電荷呢？解釋之。(30%)

