

國立高雄應用科技大學  
100 學年度碩士班招生考試  
電子工程系 (甲組)

准考證號碼  (考生必須填寫)

工程數學

試題 共 2 頁，第 1 頁

注意：a. 本試題共 6 題，共 100 分。

b. 作答時不必抄題。

c. 考生作答前請詳閱答案卷之考生注意事項。

1. If  $A$  is a  $3 \times 3$  matrix with  $|A|=5$ . In addition,  $A$  is invertible ( $A^{-1}$  exists).

Please determine the following determinants. (15%)

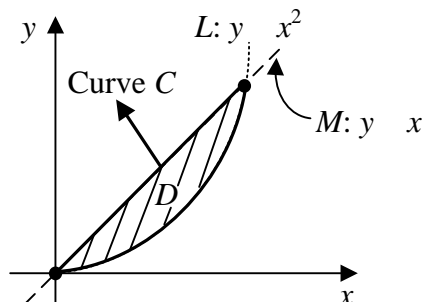
(1).  $|5A|$

(2).  $|A^2|$

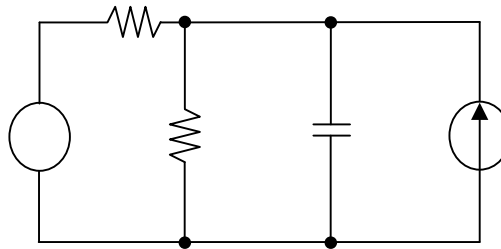
(3).  $|5A'A^{-1}|$

2. Let  $D$  be a closed bounded region in the  $xy$ -plane. If  $L: y = x^2$  and  $M: y = x$  are defined on an open region containing  $D$  and have continuous partial derivatives there. The closed curve  $C$ , composed of  $L$  and  $M$ , is a positively oriented, piecewise smooth, simple closed curve in the plane. Please calculate

$\int_C y^2 dx + (x^3 + xy) dy$  using Green's Theorem. (15%)

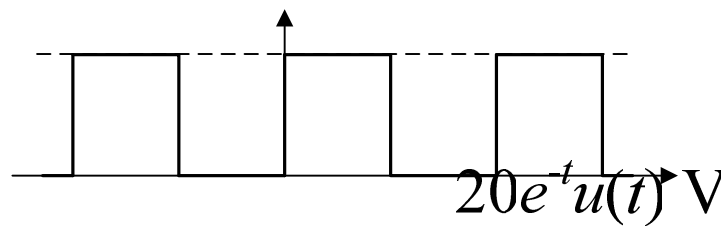


3. Assume the *rate of increase in population* is proportional to the *current population*. If the current population of a city is 10000 and the population of this city is increased to 12500 after one year. Please estimate how long is required that the population of this city will be increased to 100000 at least. (10%)
4. Assume  $v_o(0)$  is 5 V. Please find  $v_o(t)$  of the following circuit using Laplace transform. (20%)



5. Solve the D.E.
- (1).  $y'' - 6y' + 9y = 0$ ,  $y(-1) = 2$  &  $y'(-1) = 8$  (10%)
- (2).  $y''' - y'' - 8y' + 12y = 6e^{2x}$  (10%)
6. Determine the Fourier series of the following waveform  $f(t)$  shown in (a). Then apply the waveform  $f(t)$  to the circuit shown in (b) and find the corresponding response  $v_o(t)$ . (20%)

10  $\Omega$



+  
- 10  $\Omega$

