

# 海大河工系工數二(B)第三次大考(拉氏轉換)

1. Solve the complementary solutions of  $y'''=0$  using Laplace transform. (5%)  
Solve the solutions of  $y'''-3y''+3y'-y=0$  using Laplace transform (5%)
2. Solve the total solution of  $y''+y=\sin(t)$  subject to  $y(0)=0$  and  $y'(0)=0$  using Laplace transform (10%)
3. Find the Laplace transform of  $e^t$ ,  $\cosh(t)$ ,  $\cos(t)$  and  $d(t)$ . (10%)
4. Take Laplace transform of  $t^2y''-2ty'-10y=0$ . (5%)
5. Take Laplace transform of  $t^2y''+6ty'-6y=0$ . (5%)
6. Solve the solution of  $y'+y=\sin(t)+\cos(t)$  subject to  $y(0)=0$ . (10%)
7. What is convolution? (5%)
8. Plot  $a(t)=U(t)-U(t-1)$  and  $b(t)=U(t-1)-U(t-2)$  where  $U(t)$  is shown below. (10%)
9. Find the convolution of  $a(t)$  and  $b(t)$ ,  $c(t)=a(t)*b(t)$  (15%)
10. Find the Laplace transform of  $U(t)$  (2%) and  $c(t)$ . (8%)
11. Please write the initial value theorem and final value theorem. (10%)
12. If the Laplace transform of  $1/\sqrt{t}$  is  $P(s)$ , find the Laplace transform of  $\sqrt{t}$  in terms of  $P(s)$ . (10%)

(Hint: two choices: differential operator and multiplying by  $t$ )

