

University of Florida

MAP2302

EXAM II

MARCH 26, 2004

Name:

ID #:

Instructor:

Directions: You have 50 minutes to answer the following questions. You must show all your work as neatly and clearly as possible and indicate the final answer clearly. You may use only a simple not graphic calculator.

Problem	Possible	Points
1	25	
2	15	
3	10	
4	15	
5	15	
6	10	
7	10	
Total	100	

(1) (10 points) Find the inverse Laplace transform of the following functions:

(a) (5 points) $F(s) = \frac{7}{(s+3)^3}$

(b) (7 points) $F(s) = \frac{2s-1}{s^2-4s+6}$

(c) (13 points) $F(s) = \frac{1}{(s^2+4)^2}$

(2) (15 points) Write the following function in terms of the unit step function $u(t)$.

$$g(t) = \begin{cases} 0, & 0 \leq t < 1, \\ t, & 1 < t < 5, \\ 1, & 5 < t \end{cases}$$

(3) (10 points) Find the Laplace transform of the function

$$f(t) = t \sin 5t.$$

- (4) (15 points) Let $Y(s) = \mathcal{L}\{y\}(s)$ be the Laplace transform of y . Solve for $Y(s)$ if $y(t)$ is the solution of the following initial value problem

$$\begin{cases} y'' - 6y' + 5y = te^t \\ y(0) = 2 \\ y'(0) = -1 \end{cases}$$

- (5) (15 points) Find the inverse Laplace transform of the given function

$$F(s) = \frac{(s+2)e^{-3s}}{s^2 + 4s + 5}$$

- (6) (10 points) Give the form of the partial fraction decomposition for the following function. Do NOT evaluate the coefficients

$$\frac{s}{(s-1)(s^2-1)(s^2+1)}$$

- (7) This problem has the following parts.

- (a) (5 points) What method would you apply to find a particular solution to the problem? (Do not solve.)

$$y'' - 6y' + 9y = t^{-3}e^{3t}$$

- (b) (5 points) Given that $y_1(t) = \cos t$ is a solution to

$$y'' - y' + y = \sin t$$

and that $y_2(t) = \frac{1}{3}e^{2t}$ is a solution to

$$y'' - y' + y = e^{2t}$$

find a particular solution to

$$y'' - y' + y = 3 \sin t - 5e^{2t}$$