**Selected Topics in Engineering Mathematics Finals**

(2 pages)

1. Solve the following nonlinear DE: (7 scores)

 , , 

2. Solve the following PDEs: (27 scores)

(a) 

(b) ,

  ,
 , .

(c) , , 

 , , 

3. Suppose that (8 scores)

 , .

Approximate *y*(*x*) by *c*0 + *c*1*x* + *c*2*x*2 such that  is minimal.

4. Determine the following convolutions: (10 scores)

 (a) 

 (b) 

5. Determine the Fourier transforms of the following functions. (18 scores)

 (a) 

*(Continued)*

 (b) 

 (c) 

6. Suppose that (18 scores)

 .

(a) Determine det(**A**⊗**B**) where .

(b) Determine the Jordan-canonical form of **A**.

(c) Determine   and  (Using the entry-wise matrix norm).

7. Suppose that (12 scores)

 

(a) Determine the SVD of **A**.

(b) Determine the generalized inverse of **A**.