

1. Find the average water level on the Sangamon River at Illinois Rt 48 in Decatur, IL at for Sept/Oct 2000. Use the URL below and request the "stage" data for 30 days in a tab delimited file. Record the times at midnight on 9/9/2000 through midnight on 10/9/2000 so that you have a full 30 days of information (but 31 endpoints). Also record the water stage at noon for each day from 9/9/2000 to 10/8/2000. You may want to get some of the earlier information recorded now because there are can only show 30 days at a time (unless you fudge with the URL). Record the values in the attached table. (10 points)
 - a. Using the 31 values recorded at midnight, approximate the average water stage using the left-hand endpoints, right-hand endpoints, trapezoidal method, and Simpson's method
 - b. Using the 30 values recorded at noon, approximate the average water stage using the midpoints.

<http://www-il.usgs.gov/nwis-w/IL/data.components/rt.cgi?statnum=05573540>

2. Find the following Laplace Transforms (look at problems 9.8.56-57). Note that the Laplace Transform is a function of s only, there is no x in the transform. The restrictions on s that are given in the book are necessary so that the improper integral converges, be sure to state proper restrictions. (10 points)
 - a. $\mathcal{L}\{a\}$
 - b. $\mathcal{L}\{ax\}$
 - c. $\mathcal{L}\{\sin ax\}$
 - d. $\mathcal{L}\{\sinh ax\}$
 - e. $\mathcal{L}\{xe^{-ax}\}$
3. Work supplemental problem 36 involving the Gamma function. (10 points)
4. Use a table of integrals to find the integral. In each case, copy the integral number and formula and the values of any variables (ex: a or u) (10 points)
 - a. Problem 9.6.10
 - b. Problem 9.6.20
 - c. Problem 9.6.24
 - d. Problem 9.6.30
 - e. Problem 9.6.38

5. Use a computer algebra system (Derive, Maple, Mathematica, TI-89/92) to find the following integrals. (10 points)
- a. Problem 9.6.42
 - b. Problem 9.6.50
 - c. Problem 9.6.56
 - d. Problem 9.6.62
 - e. Problem 9.6.70
6. Work five (5) of the following problems by hand. There must be exactly one problem from each section (9.2, 9.3, 9.4, 9.5, and 9.8). Show all work. Clearly identify the section number and problem. Do not place more than one problem on a sheet of paper and attach the problems in section order. You may use the reduction formulas where necessary, but otherwise do not use the table of integrals. You may use a CAS to check your answer, but show work. (20 points)
- a. Problem 9.2.8
 - b. Problem 9.2.38
 - c. Problem 9.3.8
 - d. Problem 9.3.34
 - e. Problem 9.4.12
 - f. Problem 9.4.18
 - g. Problem 9.4.40
 - h. Problem 9.5.20
 - i. Problem 9.5.24
 - j. Problem 9.8.8
 - k. Problem 9.8.27
 - l. Problem 9.8.42

Day	Date	Midnight Reading	Noon Reading
1	09-Sep-2000		
2	10-Sep-2000		
3	11-Sep-2000		
4	12-Sep-2000		
5	13-Sep-2000		
6	14-Sep-2000		
7	15-Sep-2000		
8	16-Sep-2000		
9	17-Sep-2000		
10	18-Sep-2000		
11	19-Sep-2000		
12	20-Sep-2000		
13	21-Sep-2000		
14	22-Sep-2000		
15	23-Sep-2000		
16	24-Sep-2000		
17	25-Sep-2000		
18	26-Sep-2000		
19	27-Sep-2000		
20	28-Sep-2000		
21	29-Sep-2000		
22	30-Sep-2000		
23	01-Oct-2000		
24	02-Oct-2000		
25	03-Oct-2000		
26	04-Oct-2000		
27	05-Oct-2000		
28	06-Oct-2000		
29	07-Oct-2000		
30	08-Oct-2000		
31	09-Oct-2000		