Math 39100-Homework Problems

REQUIRED TEXT: Boyce, Diprima and Meade *Elementary Differential Equations and Boundary Value Problems, 11th Edition and 10th Edition*

Sections	**11th Edition**	**10th Edition**
1.3: Classifications of DE	pg. 22 # 1, 2, 4, 5, 6, 11-13, 16, & 17.	1, 2, 4, 5, 6, 16, & 17.
2.2 Separable equations	pg. 38 #1-3, 5-7, 9, 10, 11, 14, & 15. pg. 39 # 26, 27, 28, 29, 30	3-17 odd problems only 31-37 odd problems only
2.1 Meth. of Integrating Factors	pg.31 # 1-4, 6, 8, 9, 10, & 12	1-11 (odd), 13-19 (odd) & 31
2.6 Exact Equations	pg.75 # 1-4, 6, 7, 9 & 14.	1, 3, 4, 5, 7, 9, 11 & 13.
2.3 Modeling	pg.47 # 1, 2, 5, 6, & 7	1, 2, 4, 7, 8, & 9.
2.9 Ch.Rev. -Miscellaneous	pg.100 # 1-10, 12, 14, 22	1-6, 8-11, 15, & 29
2.9 Reduction of Order	pg.101 # 28, 29, 32-34	36, 37, 41, 42, 43, & 48.
3.1 Homog. w/ Const. Coeff.	pg.109 # 1-4, 7, 8, 11, 12, 16.	1-15 (odd), & 16
3.2 The Wronskian	pg. 119 # 1, 3, 4, 11, 14, 18, & 29	1, 3, 5, 14, 16, & 38
3.3 Complex Roots	pg.125 #1-3, 5-7, 12-14.	1-4, 7-10, 17-20.
3.4 Rep. Roots & Redu. of Ord.	pg.132 # 1-3, 5-8,9, 10, 18-20.	1-4, 6-10, 11, 12, 23-25.
3.5 Undetermined Coefficients	pg.141 #1-9, 11-13, 16-20 (a only)	1-10, 13, 15-17, 21, 23-26 (a only)
3.6 Variations of parameters	pg. 146 # 1, 2, 4-8, & 10.	1, 2, 5-7, 10, & 13.
3.7 Spring problems	pg.157 #3, & 4	6, & 7.
3.8 Spring problems	pg.167 #4, & 6	6, & 10.
4.2 Higher Order	pg.180 # 1-3, 8-12, 15 & 20.	1-3, 11, 12, 14, 15, 17, & 21.
4.3 Higer Order Undet. Coeff:	pg.184 # 1-4, 7, 10-13.	1-3, 9, 13, 14, 17, & 18.
5.1 Review of Power Series:	pg.195 # 1-4, 6, 7, 8, & 14.	1, 2, 3, 5, 7, 8, 11, & 14.
5.2 Ordinary Point Series, Part I:	pg.204 #1-4, 6-8(a,b, c only) & 11	1-3, 5-8 (a, b, c only) & 14.
5.3 Ordinary Point Series, Part II:	pg.209 # 1-3	1-4.
5.4 Euler Equations	pg.218 # 3-7, 9, & 11.	2, 3, 5, 6, 7, 9, 13 & 15
5.5 Regular Singular Point Series:	pg.223 # 1-3, 5 & 6.	1, 2, 3, 6, & 7.
6.1 Laplace Transform part I:	pg.247 # 4, 5, 8, 9, 12, 16-17.	5, 6, 7,8, 11-13, 21-22.
6.2 Laplace Transform part II:	pg.255 # 1, 3, 5, 8-12, & 16.	1-4, 11-16, 22, & 23.
10.1 Boundary Value Problems:	pg.468 # 1, 3, 5, & 6.	1, 3, 5, & 6.
10.2 Fourier Series:	pg.476 # 13-16, 18, 19-20 (a, b only)	13-16, 18, 19-20 (a, b only)
10.4 Even & Odd Functions:	pg.487 # 7, 9,15-18, 20-22.	7-9, 15-22.
10.5 Separation of Variables	pg.495 # 1, 2, 3, 5, & 6.	1, 2, 3, 5, & 6.
10.5 Separation of Variables:	pg.495 # 7-12.	7-12.

Additional Homework Problems

Section 3.7/3.8 Example 1: A weight of $\frac{1}{10}N$ stretches a spring 5cm (1/20 m). If the mass is set in motion from its equilibrium position with a downward velocity of 10 cm/s($\frac{1}{10}$ m/s), and if there is no damping, at what time does the mass first return to its equilibrium position?

Section 5.1 Example 1: Determine the recursive formula: $\displaystyle\sum_{n=2}^{\infty} n(n-1)a_n x^{n-2} - \sum_{n=0}^{\infty} 2a_n x^n = 0.$

Section 5.2 Example 1: For the differential equation: $(3-x)y'' + y' + y = 0$, compute the recurrence formula for the coefficients of the power series centered at $x_0 = 0$ and use it to compute the first four nonzero terms of the solution with $y(0) = -2$ and $y'(0) = 3$.

Section 5.2 Example 2: For the differential equation $y'' - xy' - y = 0$, compute the recursion formula for the coefficients of the power series solution centered at $x_0 = 1$.

Section 5.4 Example 1: Compute the general solution of $x^2y'' + 3xy' - 35y = 0$ with $x > 0$.

Section 5.4 Example 2: Solve the given initial value problem: $x^2y'' - 5xy' + 9y = 0$, with $x > 0$, $y(1) = -2$, $y'(1) = -4$. Then, find $y(e)$.

Section 5.5 Example 1: For the differential equation:

$$(x^2 + 3x^3)y'' + xy' + (x^2 - 4)y = 0$$

(a) Show that the point $x_0 = 0$ is a *regular singular point* (Either by using the limit definition or by computing the associated Euler equation).

(b) Compute the recursion formula for the series solution corresponding to the larger root of the indicial equation. With $a_0 = 1$, write down the first three nonzero terms of the series.

Section 6.1 Example 1: Using the definition, compute the Laplace Transform of the function $f(t) = \begin{cases} t & ,0 \leq t < 1 \\ 1 & ,1 \leq t \leq \infty \end{cases}$.

Section 6.2 Example 1: Solve the initial value problem by using the Laplace transform:

$$y'' - 4y' + 4y = 3, \;\; y(0) = 0, \; y'(0) = 1$$