Name: (please print name as it appears in Canvas here →) .

MATH 334:	SAM 8: HOMOGENEOUS AND NONHOMOGENEOUS PROBLEMS [35PTS]

Box or underline your answer, thanks! Work should be given on separate, single-sided, normal sized paper with no fuzzies. Problems should be in order and if any problems are skipped there should be white space and the word SKIP to help the grader. Thanks!

Problem 2 (5pts) Find the minimal annihilator for each of the following functions: for each define D as either $D = d/dx$ or $D = d/dt$ as appropriate:

(a.) $g = e^x + \sin(4x)$

(b.) $g = x^2 + \cosh(x)$

(c.) $g = te^{-3t} + 2$

(d.) $g = \cos(x)\sin(3x)$

(e.) $g = e^t \cos(6t)$

Problem 3 (5pts) Set-up, but do not explicitly determine the coefficients, the form of y_p via the method of annihilators. Notice you found the annihilators in the previous problem.

(a.) $y'' - y = e^x + \sin(4x)$

(b.) $y'' + y' = x^2 + \cosh(x)$

(c.) $y'' + 3y' = te^{-3t} + 2$

(d.) $y'' + 4y = \cos(x)\sin(3x)$

(e.) $y'' + 36y = e^t \cos(6t)$

Problem 4 (1pts) Solve $y'' - 4y' = 6t + e^t$.

Problem 5 (2pts) Solve $y'' + 2y' + y = \cos(x) + 3$ subject the initial conditions $y(0) = 0$ and $y'(0) = 1$.

Problem 6 (2pts) Consider $mx'' + bx' + kx = 0$ where $m > 0$ and $b, k \geq 0$ such that b and k are not both zero. Show that in every possible case the motion of the solution is bounded.

Problem 7 (6pts) Find the general solution of

(a.) $y'' + y = 3\cos(2x)$

(b.) $y'' + y = \csc(x)$

(c.) $y'' + y = 2\csc(x) + \cos(2x)$

Problem 8 (4pts) These require variation of parameters technique.

(a.) Solve $y'' - 2y' + y = \frac{1}{t}e^t$

(b.) Solve $y'' + y = \sec^3\theta$.