Math 2280 HOMEWORK #8 Name:

Due 3/14/2025, 8:30 A.M.

Solve the following problems and staple your solutions to this cover sheet. (Computer outputs must be put in the appropriate place in the solution, not attached as an appendix. You may physically cut and paste the output in the problem or allow appropriate space in the printout to add your hand written work.)

1. Sec 4.6 #3
   Note: Must use $v_1' = \frac{-y_2\, g}{W(y_1,y_2)}$ and $v_2' = \frac{y_1\, g}{W(y_1,y_2)}$.

2. Sec 4.6 #11
   Note: Must use $v_1' = \frac{-y_2\, g}{W(y_1,y_2)}$ and $v_2' = \frac{y_1\, g}{W(y_1,y_2)}$. Hint: You can evaluate $\int -\sin t \tan^2 t\, dt$ by substitution $u = \cos t$. $\int \frac{\sin^2 t}{\cos t}\, dt = \cdots = \ln|\sec t + \tan t| - \sin t$, using $C = 0$.

3. Sec 4.6 #16
   Hint: You can use the method of undetermined coefficient or the method of variation of parameters. Note: For the method of variation of parameters, you must use $v_1' = \frac{-y_2\, g}{W(y_1,y_2)}$ and $v_2' = \frac{y_1\, g}{W(y_1,y_2)}$.

4. Sec 4.7 #38
   Note: Must use $v_1' = \frac{-y_2\, g}{W(y_1,\, y_2)}$ and $v_2' = \frac{y_1\, g}{W(y_1,\, y_2)}$. Hint: $g(t) = \frac{t^3+1}{t^2}$.

5. Find the general solution of $v'' + 2\, t^{-1} v' = 0$.
   Note: Problem #1 in Homework #4 was the same problem, but used different variables. Hint: Let $u = v'$. Then $v'' = u'$.

6. Sec 4.7 #46
   Notes: Must apply the method of reduction of order, not the formula in Theorem 8 of Sec 4.7. Hint: You can use the result of the last problem!

7. Find the general solution of $t\, v'' + (t-1)v' = 0$.
   Note: This was Problem #2 in Homework #4 and is also in class notes but with different variables. Hint: Let $u = v'$. Then $v'' = u'$.

8. Sec 4.7 #47
   Notes: Must apply the method of reduction of order, not the formula in Theorem 8 of Sec 4.7. Hint: You can use the result of the last problem!

9. Find the general solution of $x^2\, y'' - 4x\, y' + 4y = \dfrac{1}{x^2}\ ,\ x > 0\,.$
   Hints: Must make a guess for a solution of the corresponding homogeneous equation $x^2\, y'' - 4x\, y' + 4y = 0$. For a guess think about simple functions! Use the one solution of the homogeneous equation you found by guessing to find a second linearly independent solution of the homogeneous equation. For this, you must apply the method of reduction of order, not the formula in Theorem 8 of Sec 4.7. Then, use both to find a particular solution of the original equation.

10. Free points!

11. Free points!

12. Free points!