Sp2016 Practice Exam 3:

Name_________________

Show polynomials etc. you enter in calculators and explain what you did.

No imaginary numbers in final answers.

Read the instructions. I am frequently trying to save you time.

Use the back of a page to show more work if you need to.

4 questions - 25 points each.

1. Solve $y''' - 8y = 0$ with $y[0] = 1,\ y'[0] = 2,\ y''[0] = 3$

2. Solve $y'' + 4y = \sin(2t) + e^{2t}$

Q1	Q2	Q3	Q4	Total

3.

3.1. Find the general solution of
$y^{(7)} + y^{(6)} - y^{(5)} - 5\,y^{(4)} + 4\,y'' + 4\,y' - 4\,y = 0$

3.2. Write down the form you would use for undetermined coefficients for
$y^{(7)} + y^{(6)} - y^{(5)} - 5\,y^{(4)} + 4\,y'' + 4\,y' - 4\,y = t\,e^{t} + t\sin(3\,t) + t^{2}$
Do not solve for the constants.

Score / 25

4. Solve $y''' - 4y'' + 13y' = t^2 + \cos(3t)$

Score / 25

5.

5.1. Show that $y_1 = t^2$ is a solution of $t^2\, y'' - 4\, t\, y' + 6\, y = 0$.

5.2. Solve $t^2\, y'' - 4\, t\, y' + 6\, y = t^3$.
Make sure you write down equations you are solving and explain your process and steps.

Score / 25

6.

6.1. Show that $y_1 = \cos[3 \ln[t]]$ and $y_2 = \sin[3 \ln[t]]$ are solutions of $t^2 y'' + t y' + 9 y = 0$.

6.2. Solve $t^2 y'' + t y' + 9 y = \text{Log}[t]$.
Make sure you write down equations you are solving and explain your process and steps.

Score / 25

7. Solve $y'' + 4\,y' + 4\,y = 6\,t\,e^{-2\,t}$ with $y[0] = 2$ and $y'[0] = 4$

Score / 25

8.

8.1. Verify that $\{x^2, 1/x, 1\}$ is a Fundamental Set for the ODE
$x^3\, y'''[x] + 2\, x^2\, y''[x] - 2\, x\, y'[x] == 0$.

8.2. Find a particular solution of

$$x^3\, y'''[x] + 2\, x^2\, y''[x] - 2\, x\, y'[x] == x + 1$$

by substituting a guess of the form $y_p = A\, x + B\, \ln[x]$

8.3. Write down the general solution of
$x^3\, y'''[x] + 2\, x^2\, y''[x] - 2\, x\, y'[x] == x + 1$

Score / 25