Prince Sultan University

Department of Mathematics
and
General Sciences

Math 225
Major Exam II Term 162
Duration: 90 minutes

Name: Section 429, 666
Student Number:

Grading policy:

Questions	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Total
Question Mark	5	10	6	8	10	12	51
Student Mark							

Good Luck

1. (5 points) For the equation $\left(x^2-4\right)y^{(6)}+x^3y'''+9y=0$, determine intervals in which solutions are sure to exist.

2. (10 points) Given that $y_1=\sin x^2$ is a solution of $xy''-y'+4x^3y=0,\ x>0.$ Use the method of reduction of order to find a second solution of the equation. Hint: use the integration $\int\frac{1}{\sin^2 u}du=-\cot u+C.$

3. (6 points) Find all singular points of the equation $x(3-x)y'' + (x+1)y' - 4y = 0$ and determine whether each one is regular or irregular.

4. (8 points) Find the general solution of $y^{(4)} + 2y'' + y = 4 + \cos 2t$.

5. (10 points) Use method of variation of parameters to find the general solution of the nonhomogeneous Euler equation $x^2 y'' - 2xy' + 2y = 2x^3 e^x$.

6. (12 points) Find a power series solution of $(1-x)y'' + y = 0$ about the point $x_0 = 0$. Write the first three terms in each of the two solutions.