Math 202 - Midterm (Summer 10)

T. Tlas

==

- Please answer question 4 on the same sheet of paper on which it is written. Questions 2,3 and 4 have extra sheets for you to write your answers on them. Any part of your answers written on the wrong page will not be graded.

- There are 4 problems in total. Some questions have several parts to them. Make sure that you attempt them all.

- This is a closed book exam and no calculators are allowed.

==

Name :

ID # :

==

$Q1$

$Q2$

$Q3$

$Q4$

$TOTAL$

Problem 1

(11 points each) Solve the following IVPs:

i-

$$y' = e^{x-y} \quad ; \quad y(0) = 0$$

ii-

$$y' = -\frac{y}{x} + 2e^{x^2} \quad ; \quad y(1) = 1$$

iii-

$$y' = -\frac{2y + 3x + 2y^2}{x + 2xy} \quad ; \quad y(0) = 0$$

==

ADDITIONAL SHEET FOR PROBLEM 1 ANSWER

Problem 2

(24 points) Solve the IVP

$$y'' - 2xy' - 4y = 0 \qquad ; \qquad y(0) = 0 \quad , \quad y'(0) = 1$$

Also, find y(1).

Hint: One of the series that you'll obtain cannot be written in closed form, but this won't be needed anywhere in this question.

==

ADDITIONAL SHEET FOR PROBLEM 2 ANSWER

Problem 3

(11 points each) Solve the following IVPs:

   i-

$$x^2 y'' + xy' + y = 0 \quad ; \quad y(1) = 1 \quad , \quad y'(1) = 0$$

   ii-

$$y'' - 4y' + 4y = e^x \quad ; \quad y(0) = 0 \quad , \quad y'(0) = 0$$

   iii-

$$x^2 y'' + (y')^2 = 0 \quad ; \quad y(1) = -1 \quad , \quad y'(1) = -1$$

===

ADDITIONAL SHEET FOR PROBLEM 3 ANSWER

Problem 4

(10 points) Suppose you have two functions $y_1(x)$ and $y_2(x)$ which satisfy the following two equations:

$$y_1' = y_2$$
$$y_2' = -y_1$$

If you are also given that $y_1(0) = 1, y_1'(0) = 0$, find $y_1(x)$ and $y_2(x)$.

===