

# King Fahd University of Petroleum & Minerals

## Math 202 - Sec. 1

Dr. Jawad Y. Abuhlail

Second Major Exam

Semester 061

90 Minutes

Name:

ID #:

Section #:

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REMARK: Show all details.

Q1. (15 points, estimated time 15 minutes) Find the general solution of the following equation (Hint: you may find one of the two fundamental solutions by inspection!!).

$$(1 - x^2)y'' + 2xy' = 0.$$

Q2. (60 points, estimated time 45 minutes) Solve each of the following equations:

1.  $2x^2y'' + 5xy' + y = 0$

2.  $y''' - y'' + y' - y = xe^x - e^{-x} + 7$

3.  $2y'' + y' - y = x + 1$

Q3. (25 points, estimated time 20 minutes) Use the power series method (with center  $x_0 = 0$ ) to solve the following initial value problem

$$(x - 1)y'' - xy' + y = 0, \quad y(0) = -2, \quad y'(0) = 6.$$

## GOOD LUCK