Prince Sultan University
MATH 221
Second Examination
First Semester 2015/2016, Term 151
Dr. Ahmed Kaffel

Name: _____ ID Number # _____

Q1. (5 points)

Use the composite Trapezoidal rule for the approximation of the integral $\int_1^3 \frac{dx}{7-2x}$ with $h = 0.5$. Also, compute an error term.

Q2. (6 points)

Estimate the integral $\int_{-1}^{1} \frac{dx}{1+x^2}$ using the Simpson's rules with $n = 8$.

Q3. (6 points)

Solve the following initial-value problems using the Taylor's method of order two.

(a) $y' = 2x^2 - y, \quad x = 0(0.2)1, \quad y(0) = -1.$

(b) $y' = 3x^2 y, \quad x = 0(0.2)1, \quad y(0) = 1.$

(c) $y' = x/y - x, \quad x = 0(0.2)1, \; y(0) = 2.$

Q4. (13 points)

Solve the following initial-value problems using the fourth-order Runge-Kutta formula using $h = 0.2$

$$y' = 1 + \frac{y}{x}, \quad 1 \le x \le 2 \quad y((1) = 1.$$

$$y' = y \tan x, \quad 0 \le x \le 1, \quad y(0) = 2.$$

$$y' = (1-x)y^2 - y, \quad 1 \le x \le 2 \quad y(0) = 1.$$

Q5. (3 points) Find the multiplicity of the root $\alpha = 1$ of the equation $(x-1)Ln(x) = 0$