ENCS
Engineering & Computer Science

ENGR 213

Applied Ordinary Differential Equations

First Mid Term Exam

February 5th 2017

Student Name: _____

Student ID Number: _____

ENGR 213 Section: _____

Course Given BY: _____

- Exam is closed book close notes.
- No use of any electronic devices.
- Use only the approved calculator.
- Write your answers in the provided space.

Q1	
Q2	
Q3	
Q4	
Q5	
Total	

Problem#1

Classify the following differential equation by order and linearity.

a) $\dfrac{d^2 y}{dx^2} = \left(\dfrac{dy}{dx}\right)^4$

b) $y'' = \sqrt{5x^6 + (\sin x)y^{(8)}}$

c) $e^{-x}y' + (4\sin x)y = (\tan x)y'' - 4e^{-x^2}$

d) $\dfrac{dy}{dt} = 1 - t^2$

e) $x^2 y'' + x y' + (x^2 - v^2)y = 0$

Solution:

	Order	Linearity
a)		
b)		
c)		
d)		
e)		

Problem#2:

Show that $y = \frac{1}{4}e^{3x} + ce^{-x}$ is a solution to the DE $\frac{dy}{dx} + y = e^{3x}$. What is the largest interval of existence for a solution to the IVP $y\,(-3)=15$?

Solution:

Problem#3

Solve the differential equation $y' = y^2 - 4y + 3$ given initial condition $y(0) = 3$.

Solution:

Problem#4

Solve the initial value problem $\dfrac{dy}{dx} = \dfrac{xy^2 - \cos x \sin x}{y(1 - x^2)}$, $y(0) = 2$

Solution

Problem#5

Solve the differential equation $\frac{dx}{dy} = x(yx^3 - 1)$

Solution: