6 MAY, 2013

IŞIK UNIVERSITY, MATH 203 FINAL EXAM

First Name:	Last Name:				Row#:			
Student ID:	Q1		Q2		Q3		Q4	

Q1. (13p) Solve the initial value problem

$$y'' + 4y' + 5y = \delta(t - \frac{\pi}{3}) \cos t, \qquad y(0) = y'(0) = 0.$$

Q2. (14p) Find a particular solution for $y'' - \frac{5}{t}y' + \frac{5}{t^2}y = 8t^3$ given that $y_1(t) = t$ and $y_2(t) = t^5$ are solutions of the corresponding homogeneous equation.

Q3. (13p) Evaluate the integral $\int_0^1 \int_{\sqrt{y}}^1 \sqrt{5-x^3}dxdy$.

Q4. (10p) Find the directional derivative of $f(x,y) = x^3 - 3x + y^2$ at the point (1, 1) in the direction of the vector $\overrightarrow{v} = 3\overrightarrow{i} + 4\overrightarrow{j}$.

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First Name:	Last Name:				Row#:			
Student ID:	Q5		Q6		Q7		Q8	

Q5. (10p) Solve the initial value problem $(1+x)y' = 3y^2, \quad y(0) = 2.$

Q6. (15p) Solve the system of equations

$$\mathbf{x}' = \begin{pmatrix} 0 & 2 \\ 2 & 0 \end{pmatrix} \mathbf{x} + \begin{pmatrix} 1 \\ 0 \end{pmatrix}.$$

Q7. (15p) a) Use Laplace transform to solve the initial value problem

$$y'' + 2y' + y = 0 \quad y(0) = 1, \quad y'(0) = 0.$$

b)Find the Laplace transform of the function $f(t) = \begin{cases} t, & 0 \leq t \leq 3 \\ t + \sin(t-3) & t \geq 3 \end{cases}$

Q8. (10p) Find the general solution of the equation $y^{(4)} - 3y'' - 4y = 0$.