IŞIK UNIVERSITY, MATH 203 MIDTERM EXAM II

First Name:	Last Name:			Row#:							
Student ID:	Q1		Q2		Q3		Q4				
Q1. (12p) Use the transformation $x + y = u$, $\overline{x - y} = v$ to evaluate $\int \int_{R} \int_{R} (x + y) dx$											
$(y)^2 e^{x-y} dx dy$ where R is the region bounded by the lines $x + y = 1$, $x + y = 4$,											
x - y = -1 and $x - y = 1$.											

Q2. (12p) Given that $y_1 = t$ is a solution of the equation $t^2y'' - t(t+2)y' + (t+2)y = 0$. Use the method of reduction of order to find a second solution. Then write the general solution of the differential equation. **Q3.** (11p) Solve the initial value problem; $y' + (\tan t)y = \cos^2 t$, $y(\pi/4) = 1$.

Q4. (14p) Evaluate $\int_C xyds$ where the curve C is the intersection of the elliptic paraboloid $z = 2 - x^2 - 2y^2$ and parabolic cylinder $z = x^2$ in the first quadrant from (0, 1, 0) to (1, 0, 1).

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First Name:	Last Name:		Row#:			
Student ID:	$\mathbf{Q5}$	Q6	Q7	$\mathbf{Q8}$		

Q5. (13p) Find the area of the surface cut from the cone $z = 2 - 2\sqrt{x^2 + y^2}$ by the *xy*-plane and the plane z = 1.

Q6. (13p) Find an integrating factor and then solve the differential equation

$$(2xy^{2} + y) dx + (2y^{3} - x) dy = 0.$$

Q7. (12p) Find the counterclockwise circulation of $\overrightarrow{F} = (-\sin x)\overrightarrow{i} + (x\cos y)\overrightarrow{j}$ around and over the square cut from the first quadrant by the lines $x = \pi/2$ and $y = \pi/2$.

Q8. (13p) a) For the differential equation y'' - 2y' + 2y = g(t) determine a suitable form for the particular solution if the method of undetermined coefficients is to be used where

i) $g(t) = 5 + e^{3t} + \cos t$, ii) $g(t) = t^2 + e^t \sin t$.

b) Find the general solution of the differential equation, $y'' - 3y' + 2y = e^t$.