

MODEL: A

KING ABDULAZIZ UNIVERSITY
DEPARTMENT OF MATHEMATICS
Exam/Course: Exam I - Math-204

Student Name:

Student University Number:

Instructor Name:

Section:

Time Allowed: 90 Minutes

March 27, 2011

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(Q1) Select the correct response with writing the details:

(i) The D.E. $(x^2 + 4) dy = (2x - 8xy^2) dx$ is

exact homogeneous separable (2Pt.)

(ii) The D.E. $dx = (xy^2 - y)dy$ is

Ricatti linear Bernoulli (2Pt.)

(iii) The D.E. $(1 + \frac{y}{x} + \ln x)dx = (1 - \ln x)dy$ is

exact homogeneous separable (2Pt.)

(iv) The D.E. $y' = y(1 - y)$ has the solution $y = 0$ as

a singular solution a particular solution (5Pt.)

(v) According to the Existence and Uniqueness Theorem the IVP: $y' = \sqrt{xy}$; $y(0) = 0$ has

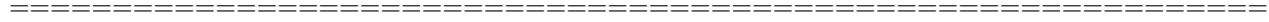
one solution an infinitely many solutions no solution (5 Pt.)

(Q_2) A large tank is filled to capacity with 300 liters of fluid in which 30 pounds of salt is dissolved. Brine containing 2 grams of salt per liter is pumped into the tank at a rate of 4 liters per minute. The well mixed solution is pumped out at a rate 3 liters per minute. Find the number $A(t)$ of grams of salt in the tank at time t . (8Pt.)

the reaction is proportional to the product of the instantaneous amounts of A and B not converted to chemical C. Initially, there are 50 grams of A and 32 grams of B, and for each grams of A, 4 grams of B is used. It is observed that 10 grams of C is formed in 5 minutes. How much is formed in 20 minutes? what is the limiting amount of C after a long time?. (8Pt.)

(Q₄) **Solve:** $y^{\frac{1}{2}} \frac{dy}{dx} + y^{\frac{3}{2}} = x; y(0) = 4$

(6Pt.)



(Q₅) **Solve: Solve:** $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}; y(1) = 0$

(6Pt.)

(Q₆) **Solve:**

$$\frac{dy}{dx} + y = f(x), \quad y(0) = 0, \quad f(x) = \begin{cases} 1 & \text{if } 0 \leq x \leq 1, \\ 0 & \text{if } x > 1. \end{cases} \quad (6Pt.)$$

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(Q₇) **Solve:** $\frac{dy}{dx} = 1 + \sqrt{y - x + 3}$, (6Pt.)

Q1	Q2	Q3	Q4	Q5	Q6	Sum	Balanced points