Kingdom of Saudi Arabia
Ministry of Higher Education
Qassim University
College of Computer
Computer Engineering Department

المملكة العربية السعودية
وزارة التعليم العالي
جامعة القصيم
كلية الحاسب
هندسة الحاسوب

Course: Math218/Differential Equations
First Semester 1442/1443 (431)

Mark_____/30

Mid Term Exam
Duration: 1 hour & 30 mins
Day: 26.10.2021

Student Name: [redacted] **ID:** [redacted]

Choose the appropriate answer.

1. An integrating factor of linear differential equation $\frac{dy}{dx} + P(x)y = f(x)$ is **(1 Mark)**

   (a) $e^{-\int P(x)dx}$ (b) $e^{\int P(x)dx}$ (c) $e^{\int f(x)dx}$ (d) $e^{-\int f(x)dx}$

2. The solution of the differential equation $y = x\log y' + y'$ is **(1 Mark)**

   (a) $y = x\log y' + c$ (b) $y = xc + \log c$. (c) $y = x\log c + c$ (d)None of these.

3. The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^2 + y = f(x)$ is **(1 Mark)**

   (a) 3 (b) 2 (c) 1 (d) 0.

Answer the following questions.

4. Evaluate $\cos x\, e^{-y}dx - y\,dy = 0$ by separation of variables. **(4 Marks)**

5. Find the differential operator that annihilates $e^x \sin x - e^{3x}\cos 2x$. **(4 Marks)**

6. Solve the linear differential equation $x\frac{dy}{dx} + xy = 2x$ subject to $y(1) = 0$. **(4 Marks)**

7. Solve homogeneous differential equation $(2x^2 + y^2)dx - xydy = 0$. **(5 Marks)**

8. Evaluate $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 0$. **(5 Marks)**

9. Determine whether the given equation is exact. If exact, Solve $(y^2 + y\cos x - x)dx + (2xy + \sin x)dy = 0$. **(5 Marks)**