Academic Year: 2009 – 2010 Mathematics: MCM 109 Semester: Summer Final Exam Date: 26 - 7 - 2010Examiner: Dr. Mohamed Husein Eid Duration Time: 1 Hour Faculty of Pharmacy Marks **Answer 4 Questions Only** [1](a) Find y` where: (i) $y = 2x^3 + 3^x$ (ii) $y = \sin x + \ln x$ (iii) $y = x^4 \cdot \cos x$ (b) Find the integrals: (i) $\int (x^2 - 2^x) dx$ (ii) $\int (\frac{1}{x} + \cos x) dx$ (iii) $\int_{0}^{2} [x^2 + 1]^2 dx$ 3 3 (c) Show that the function $f(x) = \begin{cases} \frac{x^3}{4}, & 0 \le x \le 2\\ 0, & \text{otherwise} \end{cases}$ 3 is probability density function (p.d.f) and find its probability function (p.f.) F(x). [2](a)If $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \\ 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 4 & 2 \\ -3 & 0 & 5 \end{bmatrix}$. Find, if possible, A + B, $A + B^t$. 4 (b) Solve the system of equations using inverse method: 5 x + y + z = 6, x - y + 2z = 3, 2x - y + z = 0[3]If $A = \begin{bmatrix} 2 & 0 & 1 \\ 1 & 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 4 & 2 \\ -3 & 0 & 5 \end{bmatrix}$. Find, if possible, A + B, $A \cdot B$, |A + B|, $|A \cdot B^t|$ 9 [4]A medicine in the blood decreases according to equation $y_0 - y = ct$. 9 If c = 6 units / hour and the initial quantity $y_0 = 100$ units. Find (a) The time at which 30 % of medicine exists in the blood. (b) The time at which 50 % of medicine exists in the blood. (c) The time at which there is no medicine in the blood. [5] If a medicine is available in 3 dosage forms: 9 First type of concentration: 1 mg /tablet Second type of concentration: 3 mg /tablet Third type of concentration: 4 mg/tablet

If the pharmacist wanted to prepare 10 tablets containing 2 mg / tablet

by mixing whole tablets of each type. Find all possible solutions.

Good luck