Jaypee Institute of Information and Technology
Department of Mathematics

Course: Matrix Computations (16B1NMA533)

Tutorial Sheet 12 [C301-3.6]

(Topics covered: Differentiation and Integration of matrices)

1. Check whether following matrix is continuous or not?

$$\mathrm{A(t)} = \begin{bmatrix} t^2 - 1 & \cos(t) \\ 2t & e^{(t-1)} \end{bmatrix}$$

2. Find $\dot{A}(t)$

$$\mathrm{A(t)} = \begin{bmatrix} t^2 - 1 & \cos(t) \\ 2t & e^{(t-1)} \end{bmatrix}$$

3. Find $\dot{A}(t)$

$$\mathrm{A(t)} = \begin{bmatrix} 2e^{t^3} & t(t-1) & 17 \\ t^2 + 3t - 1 & \sin 2t & t \\ cos^3(3t^2) & 4 & \ln t \end{bmatrix}$$

4. Verify following properties

i. $\frac{d\{A(t)+B(t)\}}{dt} = \frac{dA(t)}{dt} + \frac{dB(t)}{dt}$

ii. $\frac{d\{aA(t)\}}{dt} = a\frac{dA(t)}{dt}$

iii. $\frac{d\{k(t)A(t)\}}{dt} = \frac{dk(t)}{dt}A(t) + k(t)\frac{dA(t)}{dt}\; k(t) is\ a\ sclar\ function$

iv. $\frac{d\{A(t)B(t)\}}{dt} = \frac{dA(t)}{dt}B(t) + A(t)\frac{dB(t)}{dt}$

v. $\int\{\mathrm{aA(t)} + \mathrm{bB(t)}\}\mathrm{dt} = \mathrm{a}\int \mathrm{A(t)dt} + \mathrm{b}\int \mathrm{B(t)dt}$

for $a = 7;\ b = 10;\ k(t) = t^2$

$$\mathrm{A(t)} = \begin{bmatrix} t^3 & 3t^2 \\ 1 & 2t \end{bmatrix}$$

$$\mathrm{B(t)} = \begin{bmatrix} t & -2t \\ t^3 & t^5 \end{bmatrix}$$