Business Mathematics (BK/IBA) – Quantitative Research Methods I (EBE)
Tutorial 3 – Answers

Partial derivatives

A1 $\frac{\partial z}{\partial x} = 3x^2y^4$ and $\frac{\partial z}{\partial x} = 4x^3y^3$

A2 $\frac{\partial z}{\partial x} = ye^{xy}$ and $\frac{\partial z}{\partial y} = xe^{xy}$

A3 $\frac{\partial z}{\partial x} = \frac{1}{x}$ and $\frac{\partial z}{\partial y} = \frac{1}{y}$

A4 $\frac{\partial z}{\partial x} = 3x^2y^2$, $\frac{\partial z}{\partial y} = 2x^3y$, $\frac{\partial^2 z}{\partial x^2} = 6xy^2$, $\frac{\partial^2 z}{\partial y^2} = 2x^3$, $\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x} = 6x^2y$

A5 (a) $\frac{1}{10}$ (b) $\frac{2}{15}$

Indefinite integrals

A1 $\frac{1}{3}x^3 + C$

A2 $\frac{2}{5}x^2\sqrt{x} + C$

A4 $TC(q) = \frac{5}{3}q^{\frac{9}{5}} + 20$

Definite integrals

A1 $-\ln 2$

A2 $\frac{26}{3}$

A3 $\frac{1}{p+q+1} + \frac{1}{p+r+1}$

A4 $f(x) = 4x^3 - 3x^2 + 5$

A5 t^2

A6 $-e^{-t^2}$

Matrices

A1 Yes

A2 No

A3 $$\begin{cases} & - & 0.712y & & & + & c & = & 95.05 \\ 0.158x & & & - & s & + & 0.158c & = & 34.30 \\ x & - & y & - & s & + & c & = & 0 \\ x & & & & & & & = & 95.53 \end{cases}$$

A4 $u = 3$ and $v = -2$

A5 $\begin{pmatrix} 1 & 0 \\ 7 & 5 \end{pmatrix}$ and $\begin{pmatrix} 0 & 3 \\ 6 & 9 \end{pmatrix}$

A6 $\mathbf{AB} = \begin{pmatrix} 26 & 3 \\ 6 & -22 \end{pmatrix}$; $\mathbf{BA} = \begin{pmatrix} 14 & 6 & -12 \\ 35 & 12 & 4 \\ 3 & 3 & -22 \end{pmatrix}$

A7 $\mathbf{AB} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 4 & -6 \\ 0 & -8 & 12 \end{pmatrix}$; $\mathbf{BA} = 16$

A8 a. 2×3; b. not possible; c. not possible; d. 3×3

A9 $\mathbf{x} = \begin{pmatrix} 5 \\ 7 \\ 12 \end{pmatrix}$ and $\mathbf{u} = \begin{pmatrix} 20 \\ 18 \\ 25 \end{pmatrix}$

$\mathbf{u} \cdot \mathbf{x} = u_1x_1 + u_2x_2 + u_3x_3 = (5 \times 20) + (7 \times 18) + (12 \times 25) = 526$