

Business Mathematics (BK/IBA) – Quantitative Research Methods I (EBE) Tutorial 5 – Answers

Implicit differentiation

$$\begin{aligned} \text{A1} \quad y' &= \frac{-2y}{x} \\ y'' &= \frac{-(2y+4xy')}{x^2} \end{aligned}$$

$$\begin{aligned} \text{A2} \quad y'|_{(1,2)} &= -\frac{8}{5} \\ y''|_{(1,2)} &= \frac{126}{125} \end{aligned}$$

$$\text{A3} \quad (\text{a}) y'|_{(1,2)} = -\frac{8}{5} \Rightarrow y(x) \approx 2 - \frac{8}{5}(x - 1)$$

Numbers and units

$$\text{A1} \quad (\text{a}) 1.2 \cdot 10^{14} \quad (\text{b}) 60 \quad (\text{c}) 0.12 \quad (\text{d}) 1.2 \cdot 10^{-7}$$

$$\text{A2} \quad (\text{a}) 15 \text{ km} \cdot \text{hr} \quad (\text{b}) 2 \frac{\sqrt{\text{gallon}}}{\text{inch}} \quad (\text{c}) \text{impossible} \quad (\text{d}) 3.2 \text{ B\$}$$

$$\text{A3} \quad (\text{a}) 305 \text{ mm} \quad (\text{b}) 27 \cdot 10^6 \text{ s} \quad (\text{c}) 65 \cdot 10^3 \text{ euro}$$

Constrained optimization

$$\text{A1} \quad (12,4) \text{ with } \lambda = 4$$

$$\text{A2} \quad f(-3,1) = -2 \text{ (minimum)}, f(3,-1) = 2 \text{ (maximum)}$$

$$\text{A3} \quad f(2,2) = f(-2,-2) = 12 \text{ (maximum)}, f(-2,2) = f(2,-2) = -12 \text{ (minimum)}$$

$$\text{A4} \quad h = 2 \sqrt[3]{\frac{500}{\pi}}, r = \sqrt[3]{\frac{500}{\pi}}$$

Applications of integrals

$$\text{A1} \quad \frac{9}{10}$$

$$\text{A2} \quad e - e^{-1}$$

$$\text{A3} \quad Q^* = 50, P^* = 60, CS = 6000 \ln 2 - 3000, PS = 1250$$