MATHEMATICAL TYPESETTING LaTeX
,SEM 3

Q1: Write the code for the following in LaTeX environment:

$$\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n = e$$

Q2:Write the code for the matrix

$$A = \begin{bmatrix} 1 & -2 & 3 \\ 4 & 5 & 6 \\ 10 & 14 & 17 \end{bmatrix}$$

Q3:Write code to plot the cardioid given by parametric equations

$$x = cost(1 - cost)$$
$$y = sint(1 - cost), 0 \leq t \leq 2\pi$$

Q4:Write the code in latex environment

$$f(x) = \begin{cases} x^2 & , \quad 0 \leq x \leq 2 \\ -x^2 & , \quad -2 \leq x \leq 0 \end{cases}$$

Q5:Make the following multi line equations:

$$\begin{aligned} 3^3 + 4^3 + 5^3 &= 6^3 \\ \sqrt{100} &= 10 \\ (a+b)^3 &= a^3 + 3a^2b + 3ab^2 + b^3 \end{aligned}$$

Q6:Write code for the following:

$$\text{Using} \quad e^{\iota\theta} = \cos\theta + \iota\sin\theta \qquad e^{-\iota\theta} = \cos\theta - \iota\sin\theta \qquad (1)$$

$$\text{we obtain,} \quad \sin\theta = \frac{e^{\iota\theta} - e^{-\iota\theta}}{2\iota} \qquad \cos\theta = \frac{e^{\iota\theta} + e^{-\iota\theta}}{2} \qquad (2)$$

Q7:Write code in LaTeX

$$\left.\begin{aligned}\prod_n \left(1-\frac{1}{n^2}\right) &= \prod_n \frac{1}{1+\frac{1}{n^2}+\frac{1}{n^4}+\cdots} \\ &= \left(\prod_n \left(1+\frac{1}{n^2}+\frac{1}{n^4}+\cdots\right)\right)^{-1} \\ &= \left(1+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+\cdots\right)^{-1} \\ &= \frac{6}{\pi^2}\end{aligned}\right\} \tag{3}$$

Q8:Write code for the following:

$$\begin{aligned} Let\, f(x) &= \frac{1}{x+10} \qquad (4) \\ \frac{d}{dx}\left(f(x)\right) &= \frac{(x+10)\times \frac{d}{dx}1 - 1\times \frac{d}{dx}(x+10)}{(x+10)^2} \\ &= \frac{(x+10)\times 0 - 1\times 1}{(x+10)^2} \\ &= -\frac{1}{(x+10)^2} \\ \therefore \quad \frac{d}{dx}\left(f(x)\right) &= -\frac{1}{(x+10)^2} \qquad (5) \end{aligned}$$