AI1110 Assignment 2

srijan shahi
BT21BTECH11007

ICSE Grade 12 2019 paper

QUESTION 1

Question:

Evaluate:

$$\int_0^{\pi/4} \log(1+\tan\theta)\,\mathrm{d}\theta \tag{1}$$

Solution:

$$I = \int_0^{\pi/4} \log(1+\tan\theta)\,\mathrm{d}\theta \tag{2}$$

$$\implies I = \int_0^{\pi/4} \log(1+\tan(\pi/4-\theta))\,\mathrm{d}\theta \tag{3}$$

$$\implies I = \int_0^{\pi/4} \log 2 - log(1+\tan\theta))\,\mathrm{d}\theta \tag{4}$$

$$\implies 2I = \int_0^{\pi/4} \log 2\,\mathrm{d}\theta \tag{5}$$

$$= \log 2\,[\theta]_0^{\pi/4} \tag{6}$$

$$= \log 2(\pi/4-0) \tag{7}$$

$$\implies 2I = \frac{\pi(\log 2)}{4} \tag{8}$$

$$\implies I = \frac{\pi(\log 2)}{8} \tag{9}$$