

Q34

$$\int \sqrt{e^x - 1} dx$$

$$\text{Let } e^x = \sec^2 u$$

$$\sqrt{e^x - 1} = \sqrt{\sec^2 u - 1}$$

$$\sqrt{e^x - 1} = \tan u, \text{ where } 0 < u < \frac{\pi}{2}$$

$$d e^x = d \sec^2 u$$

$$e^x dx = 2 \sec u (\sec u \tan u) du$$

$$= 2 \sec^2 u \tan u du$$

$$= 2 e^x \tan u du$$

$$dx = 2 \tan u du$$

$$\int \sqrt{e^x - 1} dx$$

$$= 2 \int (\tan u) \tan u du$$

$$= 2 \int \tan^2 u du$$

$$= 2 (\tan u - u) + C$$

$$= 2\sqrt{e^x - 1} - 2 \sec^{-1} \sqrt{e^x} + C$$