Solutions to Quiz 02

1)

$$\frac{d}{dx}\left[x \log_{10}(x)\right] = \frac{d}{dx}\left[x \cdot \frac{\ln(x)}{\ln(10)}\right]$$

$$= \frac{1}{\ln(10)}\left[1 \cdot \ln(x) + x \cdot \frac{1}{x}\right]$$

$$= \frac{1}{\ln(10)}\left(\ln(x) + 1\right)$$

$$= \log_{10}(x) + \frac{1}{\ln(10)}$$

2)

$$\int 2^x \, dx = \int e^{\ln(2)x} \, dx \qquad \begin{array}{l} u = \ln(2)x \\ du = \ln(2)dx \end{array}$$

$$= \frac{1}{\ln(2)}\int e^u \, du$$

$$= \frac{1}{\ln(2)}\left[e^u + C\right]$$

$$= \frac{1}{\ln(2)} e^{\ln(2)x} + C \qquad \text{or}$$

$$= \frac{2^x}{\ln(2)} + C$$