

Question #6

$$\begin{aligned}
 a) \int \cos(2x) dx &= \int \cos(u) \cdot \frac{1}{2} du \\
 &= \frac{1}{2} \int \cos(u) du \\
 &= \frac{1}{2} \sin u + C \\
 &= \underline{\underline{\frac{1}{2} \sin(2x) + C}}
 \end{aligned}$$

$$u = 2x$$

$$\begin{aligned}
 b) \int \left(x^{16} + 16\sqrt{x} + \frac{1}{x^{16}} \right) dx &= \int x^{16} dx + \int 16\sqrt{x} dx + \int \frac{1}{x^{16}} dx \\
 &= \frac{x^{17}}{17} + \frac{16}{17} x^{17/16} - \frac{1}{15x^{15}} \\
 &= \underline{\underline{\frac{x^{17}}{17} + \frac{16}{17} x^{17/16} - \frac{1}{15x^{15}} + C}}
 \end{aligned}$$

$$\begin{aligned}
 c) \int \pi dx &= \pi x \\
 &= \underline{\underline{\pi x + C}}
 \end{aligned}$$

$$\begin{aligned}
 d) \int \left(\csc\left(\frac{x}{2}\right) \cot\left(\frac{x}{2}\right) \right) dx &= \int \csc(u) \cot(u) \cdot 2 du \\
 &= 2 \int \csc(u) \cot(u) du \\
 &= 2 \int -1 dv \\
 &= 2(-1)v \\
 &= 2(-1) \csc\left(\frac{x}{2}\right) \\
 &= -2 \csc\left(\frac{x}{2}\right) \\
 &= \underline{\underline{-2 \csc\left(\frac{x}{2}\right) + C}}
 \end{aligned}$$

$$\therefore u = \frac{x}{2}$$

$$\therefore v = \csc(u)$$