

$$\int_0^1 \int_{x^2}^{\sqrt{x}} (x^2 + y^2) dy dx$$

$$= \int_0^1 \left\{ \int_{x^2}^{\sqrt{x}} (x^2 + y^2) dy \right\} dx$$

$$= \int_0^1 \left\{ x^2 y + \frac{y^3}{3} \right\}_{x^2}^{\sqrt{x}} dx$$

$$= \int_0^1 \left\{ x^2(\sqrt{x}) + \frac{(\sqrt{x})^3}{3} - x^4 - \frac{x^6}{3} \right\} dx \quad \left| \begin{array}{l} \because x^2 \cdot \sqrt{x} = x^2 \cdot x^{1/2} \\ = x^{2+1/2} = x^{5/2} \end{array} \right.$$

$$= \int_0^1 \left\{ x^{5/2} + \frac{x^{3/2}}{3} - x^4 - \frac{x^6}{3} \right\} dx$$

$$= \int_0^1 x^{5/2} dx + \frac{1}{3} \int_0^1 x^{3/2} dx - \int_0^1 x^4 dx - \int_0^1 \frac{x^6}{3} dx$$

$$= \left(\frac{x^{5/2+1}}{5/2+1} \right)_0^1 + \frac{1}{3} \left(\frac{x^{3/2+1}}{3/2+1} \right)_0^1 - \left(\frac{x^5}{5} \right)_0^1 - \frac{1}{3} \left(\frac{x^7}{7} \right)_0^1$$

$$= \left(\frac{2}{7} x^{7/2} \right)_0^1 + \frac{1}{3} \left(\frac{2}{5} x^{5/2} \right)_0^1 - \frac{1}{5} \left(x^5 \right)_0^1 - \frac{1}{21} \left(x^7 \right)_0^1$$

$$= \frac{2}{7} (1-0) + \frac{1}{3} \times \frac{2}{5} (1-0) - \frac{1}{5} (1-0) - \frac{1}{21} (1-0)$$

$$= \frac{2}{7} + \frac{2}{15} - \frac{1}{5} - \frac{1}{21}$$

$$= \frac{30 + 14 - 21 - 5}{105} = \frac{18}{105} \text{ Ans}$$

$$\begin{array}{r} 5 \overline{) 5, 7, 10, 21} \\ 5 \overline{) 1, 7, 3, 7} \\ 2 \overline{) 1, 7, 1, 7} \end{array}$$