

$$(35) \quad r(u, v) = \langle u \cos v, u \sin v, v \rangle \quad u=1, v=\frac{\pi}{3} \quad \left\langle \frac{1}{2}, \frac{\sqrt{3}}{2}, \frac{\pi}{3} \right\rangle$$

$$r_u = \langle \cos v, \sin v, 0 \rangle \quad r_v = \langle -u \sin v, u \cos v, 1 \rangle$$

$$r_u \times r_v = \begin{vmatrix} i & j & k \\ \cos v & \sin v & 0 \\ -\sin v & \cos v & 1 \end{vmatrix} = \langle \sin v - 0, -\cos v + 0, 1 \rangle = \langle \sin v, -\cos v, 1 \rangle$$

$$\text{Normal vector} = \langle \sin\left(\frac{\pi}{3}\right), -\cos\left(\frac{\pi}{3}\right), 1 \rangle = \left\langle \frac{\sqrt{3}}{2}, -\frac{1}{2}, 1 \right\rangle$$

$$\left(x - \frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(y - \frac{\sqrt{3}}{2}\right)\left(-\frac{1}{2}\right) + \left(z - \frac{\pi}{3}\right)(1) = 0$$

$$\boxed{\frac{x\sqrt{3}}{2} - \frac{y}{2} + z = \frac{\pi}{3}}$$

$$(39) \quad 3x + 2y + z = 6 \quad A(S) = \iint_D \sqrt{1 + \left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2} dA$$

$$z = 6 - 3x - 2y \quad \frac{\partial z}{\partial x} = -3 \quad \frac{\partial z}{\partial y} = -2 \quad \sqrt{1 + 9 + 4} = \sqrt{14}$$

$$A(S) = \sqrt{14} \iint_D dA$$

$$\frac{x}{2} + \frac{y}{3} + \frac{z}{6} = 1$$

$$(2, 0, 0) \quad (0, 3, 0) \quad (0, 0, 6) \\ + (2, 0) \quad B(0, 3) \quad C(0, 0)$$

$$A_{\text{proj}} = \frac{|A \times B \times C|}{2} = \frac{|\langle 2, 0 \rangle \times \langle 0, 3 \rangle|}{2} = \frac{\begin{vmatrix} i & j & k \\ 2 & 0 & 0 \\ 0 & 3 & 0 \end{vmatrix}}{2} = \frac{\langle 0, 0, 6 \rangle}{2} = 3 = \iint_D dA$$

$$A(S) = \sqrt{14} \iint_D dA = \boxed{3\sqrt{14}}$$