$\mathbf{F}(x,y,z) = xy\,\mathbf{i} + yz\,\mathbf{j} + zx\,\mathbf{k}$, $z = g(x,y) = 8 - x^2 - y^2$, and D is the square $[0,1] \times [0,1]$, so

$$\begin{aligned} \iint_S \mathbf{F} \cdot d\mathbf{S} &= \iint_D [-xy(-2x) - yz(-2y) + zx]\, dA \\ &= \int_0^1 \int_0^1 [2x^2y + 2y^2(8 - x^2 - y^2) + x(8 - x^2 - y^2)]\, dy\, dx \\ &= \int_0^1 \left(\tfrac{1}{3}x^2 + \tfrac{23}{3}x - x^3 + \tfrac{74}{15}\right) dx = \tfrac{1553}{180} \end{aligned}$$