(9) $\iint_S x^2yz\,ds$ $\quad z = 1+2x+3y \quad [0,3]\times[0,2]$

$$\frac{\partial z}{\partial x} = 2 \quad \frac{\partial z}{\partial y} = 3 \quad \sqrt{1+4+9} = \sqrt{14} = \frac{ds}{dy\,dx}$$

$$\int_0^3\int_0^2 x^2y(1+2x+3y)\sqrt{14}\,dy\,dx$$

$$= \sqrt{14}\int_0^3\int_0^2 x^2y+2x^3y+3x^2y^2\,dy\,dx = \sqrt{14}\int_0^3\left[\frac{1}{2}x^2y^2 + x^3y^2 + x^2y^3\right]_0^2 dx$$

$$= \sqrt{14}\int_0^3 2x^2+4x^3+8x^2\,dx = \sqrt{14}\left[\frac{2}{3}x^3 + x^4 + \frac{8}{3}x^3\right]_0^3 = \sqrt{14}\left[\frac{10}{3}(27)+3^4\right)$$

$$= \sqrt{14}(90+81) = \boxed{171\sqrt{14}}$$

(13) $\iint_S z^2\,ds$ $\quad x = y^2+z^2 \quad x\in[0,1] \quad \frac{\partial x}{\partial y} = 2y \quad \frac{\partial x}{\partial z} = 2z$

$$ds = \sqrt{1+4y^2+4z^2}\,dy\,dz \qquad 1 = y^2+z^2 \qquad z^2 = r^2\sin^2\theta$$

$$r^2 = 1 \quad r\in[0,1]$$

$$\int_0^{2\pi}\int_0^1 r^3\sin^2\theta\sqrt{1+4r^2}\,dr\,d\theta = \int_0^{2\pi}\sin^2\theta\,d\theta\int_0^1 r^3\sqrt{1+4r^2}\,dr$$

$$= \left[\frac{\theta}{2} - \frac{\sin 2\theta}{4}\right]_0^{2\pi}\cdot\int_0^1 r^3\sqrt{1+4r^2}\,dr = \pi\int_0^1 r\cdot r^2\sqrt{1+4r^2}\,dr$$

$$u = 1+4r^2 \quad r^2 = \frac{u-1}{4}$$

$$= \frac{\pi}{8}\int_1^5 \frac{u-1}{4}(\sqrt{u})\,du = \frac{\pi}{32}\int_1^5 u^{3/2} - u^{1/2}\,du \qquad du = 8r\,dr \quad r\,dr = \frac{du}{8}$$

$$= \frac{\pi}{32}\left[\frac{2}{5}u^{5/2} - \frac{2}{3}u^{3/2}\right]_1^5 = \frac{\pi}{32}\left[\frac{2}{5}(25\sqrt{5}) - \frac{2}{3}(5\sqrt{5})\right] - \frac{\pi}{32}\left[\frac{2}{5} - \frac{2}{3}\right]$$

$$= \boxed{\frac{\pi}{120}(25\sqrt{5}+1)}$$