(9) $\int_C x^2 y \, ds$ $\quad x = \cos t \quad y = \sin t \quad z = t \quad t \in [0, \frac{\pi}{2}]$

$$\sqrt{\cos^2 t + \sin^2 t + 1^2} = \sqrt{1+1^2}\, dt = ds$$

$$\int_0^{\frac{\pi}{2}} \cos^2 t \sin t \sqrt{2} \, dt$$

$$\sqrt{2} \int_0^{\frac{\pi}{2}} \cos^2 t \sin t \, dt$$

$u = \cos t$
$du = -\sin t \, dt$
$-du = \sin t \, dt$

$$\sqrt{2} \int_0^1 u^2 \, du = \sqrt{2}\left(\frac{1}{3}(1-0)\right) = \boxed{\frac{\sqrt{2}}{3}}$$

(11) $\int_C x e^{yz} \, ds$ $\quad (0,0,0) \quad (1,2,3)$ $\quad r(t) = \langle t, 2t, 3t \rangle \quad t \in [0,1]$

$r'(t) = \langle 1, 2, 3 \rangle$

$|r'(t)| = \sqrt{14}\, dt = ds$

$$\int_0^1 t e^{6t^2} \sqrt{14} \, dt$$

$u = 6t^2$
$du = 12t \, dt$
$\frac{1}{12} du = t \, dt$

$$\frac{\sqrt{14}}{12} \int_0^6 e^u \, du = \boxed{\frac{\sqrt{14}}{12}(e^6 - 1)}$$

(13) $\int_C xy e^{yz} \, dy$ $\quad x = t \quad y = t^2 \quad z = t^3 \quad t \in [0,1]$

$dy = 2t \, dt$

$$\int_0^1 t^3 e^{t^5} 2t \, dt = 2 \int_0^1 t^4 e^{t^5} \, dt$$

$u = t^5$
$du = 5t^4 \, dt$
$\frac{2}{5} du = t^4 \, dt$

$$= \frac{2}{5} \int_0^1 e^u \, du = \boxed{\frac{2}{5}(e-1)}$$