6.6 A

1.(6) $\oint_L |y|\,ds$ L 为 $x^2+y^2+z^2=2$ 与 $x=y$ 的交线

令 $x=y=\cos\theta$ 则 $z=\sqrt{2}\sin\theta$

$\oint_L |y|\,ds = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos\theta\cdot\sqrt{2}\,d\theta + \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} (-\cos\theta)\sqrt{2}\,d\theta = 4\sqrt{2}$

3.(2) $\oint_{(C)} \sqrt{x^2+y^2}\,ds$ (C) 为 $x^2+y^2=ax\ (a>0)$

令 $x=\frac{a}{2}+\frac{a}{2}\cos\theta$ $y=\frac{a}{2}\sin\theta$

$\oint_{(C)} \sqrt{x^2+y^2}\,ds = \int_0^{2\pi} \sqrt{\frac{a^2}{2}(1+\cos\theta)}\cdot\sqrt{\frac{a^2}{4}}\,d\theta$

$= \int_0^{2\pi} \frac{\sqrt{2}}{4}a^2\sqrt{2\cos^2\frac{\theta}{2}}\,d\theta$

$= 2a^2$

10.(1) $\iint_{(S)} (2x+\frac{2}{3}y+z)\,dS$ (S) 为 $\frac{x}{2}+\frac{y}{3}+\frac{z}{4}=1\ (x\ge0, y\ge0, z\ge0)$

则 $z=4-2x-\frac{4}{3}y$ $0\le x\le 2$ $0\le y\le 3$

$\iint_{(S)} (2x+\frac{2}{3}y+z)\,dS = 4\sqrt{1+z_x^2+z_y^2}\,d\sigma_{xy}$

$= \frac{2}{3}\sqrt{61}\int_0^2 dx\int_0^{3-\frac{3}{2}x} dy$

$= 4\sqrt{61}$

10.(8) 求 $\iint_{(S)} (xy+yz+zx)\,dS$ S 为 $z=\sqrt{x^2+y^2}$ 被 $x^2+y^2=2ax\ (a>0)$ 所截部分

令 $z=\rho$ 则 $x=\rho\cos\theta$, $y=\rho\sin\theta$. $-\frac{\pi}{2}\le\theta\le\frac{\pi}{2}$ $0\le\rho\le 2a\cos\theta$

$\iint_{(S)} (xy+yz+zx)\,dS = \iint_{(D)} \rho^2(\sin\theta\cos\theta+(\cos\theta+\sin\theta)\sqrt{2}\rho\,d\rho\,d\theta$

$= \int_0^{2a\cos\theta} \sqrt{2}\rho^3\,d\rho\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (\sin\theta\cos\theta+\cos^3\theta+\sin\theta)\,d\theta = \frac{64}{15}\sqrt{2}a^4$