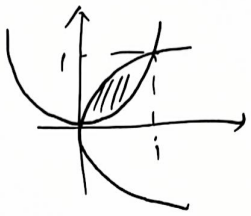
18 (1) $\iint_D xe^{xy}\,d\sigma = \int_0^1\int_0^1 xe^{xy}\,dy\,dx = \int_0^1 e^x - 1\,dx =$ e-2

(2) $\iint_D x\sin(x+y)\,d\sigma = \int_0^\pi\int_0^{\pi/2} x\sin(x+y)\,dy\,dx = \int_0^\pi x\cos x - x\cos(x+\frac{\pi}{2})\,dx$

$= \int_0^\pi x(\cos x + \sin x)\,dx = \pi - 2$

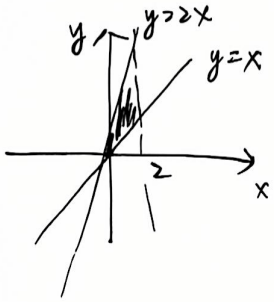
(3) $\iint_D (y+x^2)\,d\sigma = \int_0^1\int_{x^2}^{\sqrt{x}} (y+x^2)\,dy\,dx$



~~$= \int_0^1 \frac{1}{2}x - \frac{1}{2}x^4 + x^2\,dx =$~~

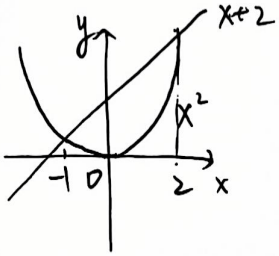
$= \int_0^1 \frac{1}{2}x - \frac{1}{2}x^4 + x^2(\sqrt{x} - x^2)\,dx = \frac{33}{140}$

(4) $\iint_D x+6y\,d\sigma = \int_0^2\int_x^{2x} x+6y\,dy\,dx$



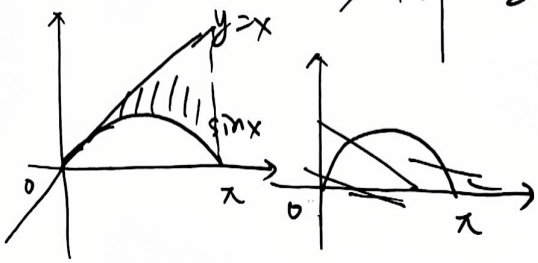
$= \int_0^2 x^2 + 9x^2\,dx = \frac{80}{3}$

19 (1) $S = \iint_D d\sigma = \int_{-1}^2\int_{x^2}^{x+2} dy\,dx = \int_{-1}^2 x+2-x^2\,dx = \frac{9}{2}$



(2) $S = \iint_D d\sigma = \int_0^\pi\int_{\sin x}^{x} dy\,dx$

$= \int_0^\pi (x - \sin x)\,dx = \frac{\pi^2}{2} - 2$



20 $V = \iint_D z\,d\sigma = \int_0^1\int_0^{1-x} (1+x+y)\,dy\,dx$

$= \int_0^1 1-x^2 + \frac{1}{2}(1-x)^2\,dx = \frac{5}{6}$