10-2. 1(4) 2(3), (4), 4(2), (4),
6, 9, 12, 13, 14, 15, 17.

1.(4). 解：由题得， $0 \le y \le x,\ x \in [0, \pi]$.

$$\iint x\cos(x+y)\,d\sigma = \int_0^\pi x\,dx \cdot \int_0^\pi \cos(x+y)\,dy$$

$$= \int_0^\pi x\left[\sin(x+y)\right]_0^x dx$$

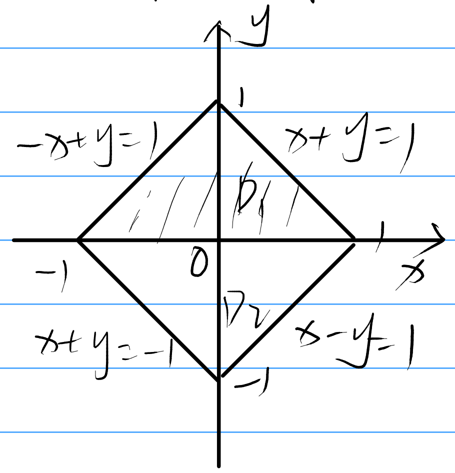
$$= \int_0^\pi x\cdot(\sin 2x - \sin x)\,dx$$

$$= \int_0^\pi x \cdot d\left(\cos x - \frac{1}{2}\cos 2x\right)$$

$$= -\frac{3}{2}\pi - \int_0^\pi \left(\cos x - \frac{1}{2}\cos 2x\right)dx$$

$$= -\frac{3}{2}\pi.$$

2.(3). 解：如图：

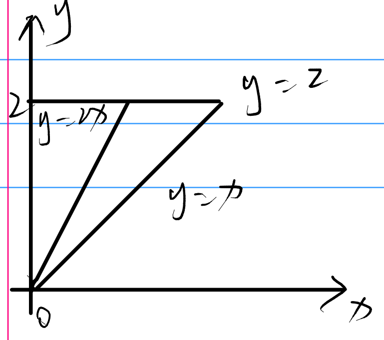


则 $\iint\limits_D e^{x+y}\,d\sigma = \iint\limits_{D_1} e^{x+y}\,d\sigma + \iint\limits_{D_2} e^{x+y}\,d\sigma$

$$= \int_{-1}^0 e^x\,dx \int_{-x-1}^{x+1} e^y\,dy + \int_0^1 e^x\,dx \int_{x-1}^{-x+1} e^y\,dy$$

$$= e - \frac{1}{e}$$

2.(4). 解：如图：



则 $\iint\limits_D (x^2+y^2-x)\,d\sigma = \int_0^2 dy \int_{\frac{y}{2}}^{y} (x^2+y^2-x)\,dx$

$$= \int_0^2 \left[\frac{x^3}{3} + y^2 x - \frac{x^2}{2}\right]_{\frac{y}{2}}^{y} dy = \frac{13}{6}$$

$\frac{19}{24}y^3 - \frac{2}{8}y^2$ 0, 2

4(2). $0\le y\le\sqrt{r^2-x^2}$, $-r\le x\le r$ 时,

$$I=\int_{-r}^{r}dx\int_{0}^{\sqrt{r^2-x^2}}f(x,y)\,dy$$

$-\sqrt{r^2-y^2}\le x\le\sqrt{r^2-y^2}$, $0\le y\le r$ 时,

$$I=\int_{0}^{r}dy\int_{-\sqrt{r^2-y^2}}^{\sqrt{r^2-y^2}}f(x,y)\,dx.$$

(4) 对小圆竖直作两条切线得,

$$I=\int_{-2}^{-1}dx\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}}f(x,y)\,dy+\int_{-1}^{1}dx\int_{-\sqrt{4-x^2}}^{-\sqrt{1-x^2}}f(x,y)\,dy$$

$$+\int_{-1}^{1}dx\int_{\sqrt{1-x^2}}^{\sqrt{4-x^2}}f(x,y)\,dy+\int_{1}^{2}dx\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}}f(x,y)\,dy.$$

水平作切线分割得:

$$I=\int_{-2}^{-1}dy\int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}}f(x,y)\,dx+\int_{-1}^{1}dy\int_{-\sqrt{4-y^2}}^{-\sqrt{1-y^2}}f(x,y)\,dx$$

$$+\int_{-1}^{1}dy\int_{\sqrt{1-y^2}}^{\sqrt{4-y^2}}f(x,y)\,dx+\int_{1}^{2}dy\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}}f(x,y)\,dx.$$