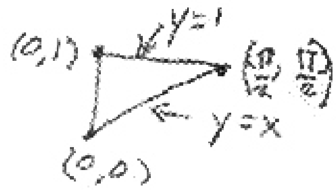
(1)



$$\iint_T \sin(x+y)\,dA = \int_{x=0}^{\pi/2}\int_{y=x}^{\pi/2} \sin(x+y)\,dy\,dx$$

$$= \int_{x=0}^{\pi/2} -\cos(x+y)\Big|_{y=x}^{\pi/2} dx = \int_{x=0}^{\pi/2} [\cos(2x) - \cos(x+\pi/2)]\,dx$$

$$= \left\{\left[\frac{1}{2}\sin(2x) - \sin(x+\pi/2)\right]\Big|_{x=0}^{\pi/2} = \left[\frac{1}{2}0 - 0\right] - \left[\frac{1}{2}0 - \sin\left(\frac{\pi}{2}\right)\right]\right.$$

$$= \boxed{1}.$$

(2)

$$\iint_C e^{x^2+y^2}\,dA = \int_{r=0}^{1}\left\{\int_{\theta=0}^{2\pi} e^{r^2}\, r\,dr\right\}d\theta =$$

$$\int_{\theta=0}^{2\pi}\left\{\int_{r=0}^{1} re^{r^2}\,dr\right\}d\theta = \left\{\int_{r=0}^{1} re^{r^2}\,dr\right\}\left\{\int_{\theta=0}^{2\pi} d\theta\right\}$$

$$= \left\{\int_{s=0}^{1} e^{s}\,ds\right\}\{2\pi\} = \boxed{2\pi(e-1)}.$$

$s = r^2$

$\frac{ds}{2} = r\,dr$

(3) The integral is over a symmetric volume with respect to the yz-plane, so the negative and positive parts of the integral cancel, so

$$\iiint_Q x\,dV = \boxed{0}$$

(4)

$$\iiint_C (x+y)^2\,dV = \int_{x=0}^{1}\int_{y=0}^{1}\int_{z=0}^{1} (x+y)^2\,dz\,dy\,dx$$

$$= \int_{x=0}^{1}\int_{y=0}^{1} (x+y)^2\,dy\,dx = \int_{x=0}^{1}\left[\frac{(x+y)^3}{3}\right]\Big|_{y=0}^{1} dx$$

$$= \int_{x=0}^{1} -\frac{x^3}{3} + \frac{(x+1)^3}{3}\,dx = \frac{(x+1)^4}{12}\Big|_{x=0}^{1} - \frac{1}{12} = \frac{1}{12}[16-1] - \frac{1}{12} = \frac{15}{12} = \cancel{\frac{5}{4}}\ \boxed{\frac{7}{6}}$$