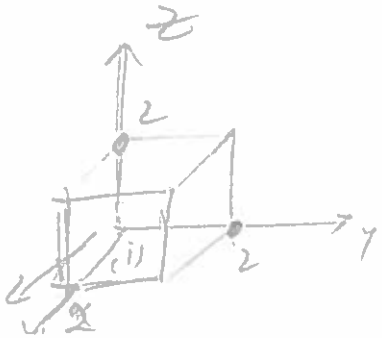
$$\oint \bar{v}\cdot d\bar{l} = \int_{a_1}^{b} \bar{v}\cdot d\bar{l} + \int_{b_2}^{a} \bar{v}\cdot dl$$

$$= \int_{a_1}^{b} \bar{v}\cdot d\bar{l} - \int_{a_2}^{b} \bar{v}\cdot dl = 11 - 10 = 1$$

Ex 10 $\int \bar{v}\cdot d\bar{a}$



(i) $\int \bar{v}\cdot(dy\,dz)\,\hat{i}$

$$\int \left(2xz\,\hat{i} + (x+2)\,\hat{j} + y(z^2-3)\,\hat{k}\right)\cdot dy\,dz\,\hat{i}$$

$$= \int_{x=2} 2xz\,dy\,dz = 2\times 2\iint z\,dy\,dz = 4\,\frac{z^2}{2}\times y\Big|_0^2\Big|_0^2$$

$$= 2\left[4\times 2\right] = 16$$