

$$1.7 \quad \vec{F} = \begin{pmatrix} xy \\ yz \\ zx \end{pmatrix}$$

$$a) \quad \int \vec{F} \cdot d\vec{s} = \int \begin{pmatrix} xy \\ yz \\ zx \end{pmatrix} \cdot \begin{pmatrix} dx \\ dy \\ dz \end{pmatrix}$$

Parametrisiere nun den Weg $x(t) = t$ $y(t) = t$ $z(t) = t$

$$r(t) = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \cdot t \quad \frac{dx}{dt} = 1 \quad \frac{dy}{dt} = 1 \quad \frac{dz}{dt} = 1$$

$$\int_0^1 \begin{pmatrix} t^2 \\ t^2 \\ t^2 \end{pmatrix} \cdot \begin{pmatrix} dt \\ dt \\ dt \end{pmatrix} = \int_0^1 3t^2 dt = 1$$

$$b) \quad i) (0, 0, 0) \rightarrow (1, 0, 0) \quad x(t) = t \quad y(t) = 0 \quad z(t) = 0$$

$$\frac{dx}{dt} = 1 \quad \frac{dy}{dt} = 0 \quad \frac{dz}{dt} = 0$$

$$\int \vec{F} \cdot d\vec{s} = \int_0^1 \begin{pmatrix} x \cdot 0 \\ 0 \cdot 0 \\ 0 \cdot x \end{pmatrix} \cdot \begin{pmatrix} dt \\ 0 \\ 0 \end{pmatrix} = 0$$

$$ii) (1, 0, 0) \rightarrow (1, 1, 0) \quad x(t) = 0 \quad y(t) = t \quad z(t) = 0$$

$$\frac{dx}{dt} = 0 \quad \frac{dy}{dt} = 1 \quad \frac{dz}{dt} = 0$$

$$\int \vec{F} \cdot d\vec{s} = \int_0^1 \begin{pmatrix} 1 \cdot t \\ t \cdot 0 \\ 0 \cdot 1 \end{pmatrix} \cdot \begin{pmatrix} 0 \\ dt \\ 0 \end{pmatrix} = 0$$

