

H17

2

(1)

$$(i) (2, 0, 0) \rightarrow (0, 3, 0)$$

$$r(t) = (2, 0, 0) + t(-2, 3, 0)$$

$$= (2-2t, 3t, 0)$$

$$A(r) = (-3t, 4-4t, 2+t)$$

$$\int_C A \cdot dr = \int_0^1 (-3t, 4-4t, 2+t)(-2, 3, 0) dt$$

$$= \int_0^1 (6t + 12 - 12t) dt$$

$$= \left[-3t^2 + 12t \right]_0^1 = 9$$

$$(ii) (0, 3, 0) \rightarrow (0, 0, 6)$$

$$r(t) = (0, 3, 0) + t(0, -3, 6)$$

$$= (0, 3-3t, 6t)$$

$$A(r) = (9t-3, 6t, 3-3t)$$

$$\int_C A \cdot dr = \int_0^1 (9t-3, 6t, 3-3t)(0, -3, 6) dt$$

$$= \int_0^1 (-18t + 18 - 18t) dt$$

$$= \left[-18t^2 + 18t \right]_0^1 = 0$$

I.e.

$$\int_C A \cdot dr = 9 + 0 = 9$$

(2)

2.1-7.2 a 定理 5.4

$$\iint_S \text{rot } A \cdot n \, dS = \int_C A \cdot dr = 9$$