

$$4. \int_C \underbrace{(3x-y+4)}_M dx - \underbrace{(x+y-5)}_N dy \quad (0,1) \text{ to } (3,e^3)$$

$$f = \int (3x-y+4) dx$$

$$f = \int (x-y+5) dy$$

$$\frac{\partial M}{\partial y} = -1 \quad \frac{\partial N}{\partial x} = -1$$

YES

$$f = \frac{3}{2}x^2 - xy + 4x$$

$$f = -xy - \frac{1}{2}y^2 + 5y$$

$$f(x,y) = \frac{3}{2}x^2 + 4x - \frac{1}{2}y^2 + 5y - xy$$

$$\frac{(3, e^3)}{x \quad y}$$

$$f(3, e^3)$$

-

$$\frac{(0, 1)}{x \quad y}$$

$$f(0, 1)$$

$$= \frac{3}{2}(3)^2 + 4(3) - \frac{1}{2}(e^3)^2 + 5(e^3) - 3e^3 - \left(\frac{3}{2}(0)^2 + 4(0) - \frac{1}{2}(1)^2 + 5(1) - 0(1) \right)$$

$$= \frac{27}{2} + 12 - \frac{1}{2}e^6 + 5e^3 - 3e^3 - \left(-\frac{1}{2} + 5 \right)$$

$$= \frac{27}{2} + 12 - \frac{1}{2}e^6 + 2e^3 + \frac{1}{2} - 5$$

$$= 14 + 7 - \frac{1}{2}e^6 + 2e^3$$

$$= \boxed{21 - \frac{1}{2}e^6 + 2e^3}$$