

13.3 | 연습문제 정답

01.

(a) $f(x, y) = \frac{1}{3}x^3 + \frac{1}{3}y^3 + c$

(b) 보존적이 아니다.

(c) $f(x, y) = 2e^y x - ye^x + c$

(d) $f(x, y, z) = x^3 + 2y^3 + 3z^3 + c$

02. $\int_{(1,1,2)}^{(3,5,0)} yzdx + xzdy + xydz = f(3,5,0) - f(1,1,2) = -2$

03. $\int_{(1,0,0)}^{(0,1,1)} (\sin y \cos x)dx + (\cos y \sin x)dy + dz = f(0,1,1) - f(1,0,0) = 1$

04. $\int_{(1,2,1)}^{(2,1,1)} (2x \ln y - yz)dx + \left(\frac{x^2}{y} - xz\right)dy - xydz = f(2,1,1) - f(1,2,1) = -\ln 2$

05. $\int_{(-1,-1,-1)}^{(2,2,2)} \frac{2x dx + 2y dy + 2z dz}{x^2 + y^2 + z^2}$
 $= f(2,2,2) - f(-1,-1,-1) = \ln 12 - \ln 3 = \ln 4$

06. 생략

07. 생략

08.

(a) $C: x = t, y = t, 0 \leq t \leq 1 : 5$

(b) $f(x, y) = 2x^2y - 3x + y^4 + 5y + C \quad \therefore \int_C \mathbf{F}(x, y) \cdot d\mathbf{r} = f(1, 1) - f(0, 0) = 5$

09. $f(x, y) = x^4 + 3x^3y^2 + y^6 + C : \therefore \int_C \mathbf{F}(x, y) \cdot d\mathbf{r} = f(1, 2) - f(0, 0) = 77$

10. $C: x = t, y = t^2, z = t^3, 0 \leq t \leq 1 : \frac{29}{60}$

11. $f(x, y, z) = e^x \cos y + \frac{1}{2}x^2y + \frac{1}{2}yz^2 + C : 0$

12. $f = e^x \sin z + 2xyz + y^2: \int_C \mathbf{F} \cdot d\mathbf{r} = f(1, -2, \pi) - f(0, 0, 0) = 4 - 4\pi$

13. $f(x, y, z) = GmM \frac{1}{\sqrt{x^2 + y^2 + z^2}} + c$

14. 생략