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. $\int_{(-1,-1,-1)}^{(2,2,2)} \frac{2x\,dx+2ydy+2zdz}{x^2+y^2+z^2}$

$=f(2,2,2)-f(-1,-1,-1)=\ln 12-\ln 3=\ln 4$

06. 생략

07. 생략

08. $2+\sqrt{3}$

09.

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

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

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

11. $C: x=t,\ y=t^2,\ z=t^3,\ 0 \le t \le 1\ :\ \dfrac{29}{60}$

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

13. $f = e^x \sin z + 2xyz + y^2$: $\int_C F \bullet dr = f(1,-2,\pi) - f(0,0,0) = 4-4\pi$

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