

11.3 | 연습문제 정답

01. (a) 0

(b) $-\ln t \cos(t \ln t) - \cos(t \ln t) + e^{t-1}$

(c) $\frac{\sec^2 t}{\tan t} - 2 \tan t$

(d) $-4t^3 + 2t - 1$

02. (a) (i) $\frac{\partial \omega}{\partial t} = -2t + 2s^2$ $\frac{\partial \omega}{\partial s} = 2s + 4st$ (ii) $\frac{\partial w}{\partial v} = -2v + 2uv$

(b) $\frac{\partial \omega}{\partial t} = -\frac{2s^2}{t^3} + s^2 - s^2 \ln \frac{s}{t}$ $\frac{\partial \omega}{\partial s} = \frac{2s}{t^2} - st - 2st \ln \frac{s}{t}$

(c) $\frac{\partial \omega}{\partial t} = -1$ $\frac{\partial \omega}{\partial s} = 0$

03. $\frac{\partial u}{\partial x} = 0$ $\frac{\partial u}{\partial y} = \frac{z}{(z-y)^2}$ $\frac{\partial u}{\partial z} = -\frac{y}{(z-y)^2}$

따라서 $\frac{\partial u}{\partial x}(\sqrt{3}, 2, 1) = 0$, $\frac{\partial u}{\partial y}(\sqrt{3}, 2, 1) = 1$, $\frac{\partial u}{\partial z}(\sqrt{3}, 2, 1) = -2$

04. $\frac{\partial u}{\partial x} = 1 + 2xyz + y^2z + yz^2 + yz$ $\frac{\partial u}{\partial y} = xyz + 1 + (x + y + z + 1)xz$

$\frac{\partial u}{\partial z} = xyz + 1 + (x + y + z + 1)xy$

$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = -6$

05. $(x, y, z) = (\cos(-2), \sin(-2), -2)$, $(x, y, z) = (\cos 1, \sin 1, 1)$

06. $\frac{df}{dt}(0, 0) = 0$

07. $\frac{dz}{dt}(3) = 2\sqrt{5}$

08. $-f'\left(\ln x + \frac{1}{y}\right)$

09. $\frac{\partial w}{\partial r} = f_x(x, y, z)(1) + 0 + f_z(x, y, z)(-1)$

$$\frac{\partial w}{\partial s} = f_x(x, y, z)(-1) + f_y(x, y, z)(1) + 0$$

$$\frac{\partial w}{\partial t} = 0 + f_y(x, y, z)(-1) + f_z(x, y, z)(1)$$

$$\therefore \frac{\partial w}{\partial r} + \frac{\partial w}{\partial s} + \frac{\partial w}{\partial t} = 0$$

10. 생략

11. 생략

12. 생략

13. $\frac{\partial z}{\partial x} = -\frac{6xz - yz^3}{3x^2 - 3xyz^2}$

14. $\frac{\partial x}{\partial z} = -\frac{\sin x}{z \cos x - ye^{-x}}$

15. $\frac{\partial z}{\partial x}(2, 0, 0) = -\frac{2}{9}$