14.5 Answers

(1) a) $(y^2 - 2xy)3t^2 - 2t(2xy - x^2)$

b) $\dfrac{-2y \sin t}{2x+y} + \left[\ln(2x+y) + \dfrac{y}{2x+y}\right]\cos t$

(2) a) $\dfrac{\partial z}{\partial s} = \dfrac{-y}{x^2} e^{-t} + \dfrac{1}{x} e^{t}$

$\dfrac{\partial z}{\partial t} = \dfrac{y}{x^2} s e^{-t} + \dfrac{1}{x} s e^{t}$

b) $\dfrac{\partial z}{\partial s} = (e^r \sin\theta)\, t + \dfrac{s e^r \cos\theta}{\sqrt{s^2+t^2}}$

$\dfrac{\partial z}{\partial t} = (e^r \sin\theta)\, s + \dfrac{t e^r \cos\theta}{\sqrt{s^2+t^2}}$

(3) $-\sin(u^2+v)\sin(u^2-v^2) - 2v\cos(u^2+v)\cos(u^2-v^2)$

(4) 252, 252, 48

(5) $\left.\dfrac{\partial z}{\partial x}\right|_{x=1,y=1} = \boxed{\dfrac{28}{19}} = \left.\dfrac{\partial z}{\partial y}\right|_{x=1,y=1}$

(6) $\dfrac{16720}{3}\pi$ in^3/sec

(7) -0.0015 amps/sec

so, the current is decreasing by 0.0015 amp/sec

(8) a) $\frac{\partial z}{\partial x} = \frac{-3x^2+4yz}{2(z-2xy)}$, $\frac{\partial z}{\partial y} = \frac{-y+2xz}{z-2xy}$

b) $\frac{\partial z}{\partial x} = \frac{\cos(x+y+z)-yz}{xy-\cos(x+y+z)}$

$\frac{\partial z}{\partial y} = \frac{\cos(x+y+z)-xz}{xy-\cos(x+y+z)}$