13.5 #2

With Multivariate Chain Rule

$$\frac{dw}{dt} = \frac{\partial w}{\partial x}\frac{dx}{dt} + \frac{\partial w}{\partial y}\frac{dy}{dt} + \frac{\partial w}{\partial z}\frac{dz}{dt}$$

$$= (2x)(1) + (2y)(-\sin t) + (4z)(\cos t)$$

$$= 2(t+1) + 2\cos t(-\sin t) + 4\sin t \cos t$$

$$= 2t + 2 + 2\sin t \cos t$$

Without Multivariate Chain Rule

$$W = x^2 + y^2 + 2z^2 = (t+1)^2 + \cos^2 t + 2\sin^2 t$$

So $\dfrac{dw}{dt} = 2(t+1)(1) + 2\cos t(-\sin t) + 4\sin t \cos t$

$$= 2t + 2 + 2\sin t \cos t$$