24. \( wz = ze^{xyz} \). Find first order partials

\[
\frac{\partial w}{\partial x} = ze^{xyz} (yz) = yz^2 e^{xyz}
\]

\[
\frac{\partial w}{\partial y} = ze^{xyz} (xz) = xz^2 e^{xyz}
\]

\[
\frac{\partial w}{\partial z} = e^{xyz} + ze^{xyz} (xy) = e^{xyz} + xyze^{xyz}
\]

11.14 12c. \( f(x, y) = y + \sin\left(\frac{x}{y}\right) \) at \( (0, 3) \)

At \( (0, 3) \), \( y \) and \( x \) are differentiable, so the composition \( \sin\left(\frac{x}{y}\right) \) is also differentiable. Thus, the sum \( y + \sin\left(\frac{x}{y}\right) \) is also differentiable.

\( L(x,y) = f(0,3) + f_x(0,3)(x-0) + f_y(0,3)(y-3) \)

\( f(0,3) = 3 + \sin\left(\frac{0}{3}\right) = 3 \)

\( f_x(0,3) = \cos\left(\frac{x}{y}\right) \) at \( (0,3) \) is \( \frac{1}{3} \), so \( f_x(0,3) \) is \( \frac{1}{3} \), and

\( f_y(0,3) = \) \( \frac{1}{3} \) is \( \frac{1}{3} \), so \( f_y(0,3) \) is \( \frac{1}{3} \), and

\( f_x(0,3) = 1 + \cos\left(\frac{x}{y}\right) \left(\frac{x}{y}\right) \) at \( (0,3) \)

\( f_y(0,3) = 1 + \cos\left(\frac{x}{y}\right) \) at \( (0,3) \)

Thus,

\( L(x,y) = 3 + \frac{1}{3}x + 1(y-3) \)
\[ T = x^2 + y^2 + xy \quad x = \sin t \quad y = e^t \]

\[
\frac{\partial T}{\partial t} = \frac{\partial T}{\partial x} \frac{\partial x}{\partial t} + \frac{\partial T}{\partial y} \frac{\partial y}{\partial t}
\]

\[
= (2x + y)(\cos t) + (2y + x) e^t
\]