

$$1. dw = ze^y dx + zxe^y dy + xe^y dz + e^y dx + xe^z dz + e^z dy + ye^z dz$$

$$2. dw = (ze^y + e^z) dt + (zxe^y + e^z) 2t dt + (xe^y + xe^z + ye^z) 3t^2 dt$$

3.

$$(2xy + y^2) dx + (x^2 + 2xy) dy = 0$$

$$\Rightarrow \frac{x^2 + 4xy + y^2}{x^2 + 2xy} = \frac{\partial w}{\partial x}$$