(3) $e^z = xyz$

$$e^z \frac{\partial z}{\partial x} = yz + xy \frac{\partial z}{\partial x}$$

$$e^z \frac{\partial z}{\partial x} - xy \frac{\partial z}{\partial x} = yz$$

$$\boxed{\frac{\partial z}{\partial x} = \frac{yz}{e^z - xy}}$$

$$e^z \frac{\partial z}{\partial y} = xz + xy \frac{\partial z}{\partial y}$$

$$e^z \frac{\partial z}{\partial y} - xy \frac{\partial z}{\partial y} = xz$$

$$\boxed{\frac{\partial z}{\partial y} = \frac{xz}{e^z - xy}}$$

(4) $g(p,q) = p^4 - p^2 q^3 \quad (2,1) \quad \vec{v} = \langle 2, 3 \rangle$

$$|\vec{v}| = \sqrt{4+9} = \sqrt{13}$$

$$\vec{u} = \frac{\vec{v}}{|\vec{v}|} = \left\langle \frac{2}{\sqrt{13}}, \frac{3}{\sqrt{13}} \right\rangle$$

$$\nabla g(p,q) = \langle 4p^3 - 2pq^3, -3q^2 p^2 \rangle$$

$$\nabla g(2,1) = \langle 4(8) - 2(2)(1^3), -3(2^2)1^2 \rangle = \langle 32 - 4, -12 \rangle = \langle 28, -12 \rangle$$

$$D_{\vec{u}} g(2,1) = \langle 28, -12 \rangle \cdot \left\langle \frac{2}{\sqrt{13}}, \frac{3}{\sqrt{13}} \right\rangle = \frac{56}{\sqrt{13}} - \frac{36}{\sqrt{13}} = \frac{20}{\sqrt{13}}$$

$$\boxed{D_{\vec{u}} g(2,1) = \frac{20\sqrt{13}}{13}}$$