

Math 367 – Tutorial #1

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1. Evaluate z_x and z_y , where:

(a) $z = xe^{x^2+y^2}$

(b) $z = \cos(e^{x^2y^3})$

(c) $xy^2 + yz^2 + xyz = 1$

(d) $z = x^y$

2. Let

$$f(\mathbf{x}) = \|\mathbf{x}\|^r, \quad \mathbf{x} \in \mathbb{R}^n.$$

Show that

$$\nabla f(\mathbf{x}) = r\|\mathbf{x}\|^{r-2}\mathbf{x}.$$

3. Let $y = f(\mathbf{x})$, $\mathbf{x} \in \mathbb{R}^n$. Show that

$$\nabla y^r = ry^{r-1}\nabla y.$$