

Names \_\_\_\_\_

Please hand in one worksheet per group.

1. Let  $x^3 + y^3 + z^3 + 6xyz = 1$ .

(a) Find  $\frac{\partial z}{\partial x}$ .

(b) Find  $\frac{\partial z}{\partial y}$ .

(c) Find the linearization of  $z$  at the point  $(0, 0, 1)$ .

2. Consider problem #37 in section 14.4 of your book.

(a) Calculate  $\frac{\partial R}{\partial R_i}$ , for  $i = 1, \dots, 3$ .

(b) Using their values of  $R_i$  and  $dR_i$  calculate the differential  $dR$ , i.e.

$$dR = \frac{\partial R}{\partial R_1} dR_1 + \frac{\partial R}{\partial R_2} dR_2 + \frac{\partial R}{\partial R_3} dR_3.$$

Note that  $dR$  is an estimate of  $\Delta R$ , the maximum possible error in the calculated value of the total resistance  $R$ .

3. Consider  $w = e^{xyz}$  where  $x = 3r + s$ ,  $y = 3r - s$ ,  $z = -r^2s$ .

(a) Find  $\frac{\partial w}{\partial r}$ .

(b) Find  $\frac{\partial w}{\partial s}$ .