Lesson 21

Notes

Examples

Example 1. Estimate the change in z at the point (6,8) for a change in x of 0.4 and a change in y of 0.6 given

$$\frac{\partial z}{\partial x} = -7x - 6$$
 and $\frac{\partial z}{\partial y} = 3y + 10.$

Example 2. Approximate to 3 decimal places

$$\sqrt{(7.5)^2 + (8.5)^2} - \sqrt{7^2 + 8^2}.$$

Example 3. The pressure of an ideal gas, measured in kPa, is related to its volume V and temperature T by the equation

PV = 0.34T.

The temperature is measured with an error of 3 Kelvin and the volume is measured with an error of 0.8m^3 . If it is known that the actual values are T = 244 K and $V = 3 \text{m}^3$, what is the estimated maximum error in the measurement of pressure?

Example 4. A soft drink can is a cylinder H cm tall with radius r cm. Its volume is given by the formula $V(r, h) = \pi r^2 h$. A particular can is 10 cm tall and has a radius of 3 cm. If the height is increased by 1.4 cm, estimate the change in the radius needed so that the volume stays the same.

Example 5. The specific gravity of an object with density greater than that of water can be determined by using the formula

$$S = \frac{A}{A - W},$$

where A and W are the wights of the object in air and water, respectively. If the measurements of an object are A = 2 pounds and W = 1.7 pounds with maximum errors of 0.03 pounds and 0.08 pounds, respectively, find the approximate relative percentage error in calculating S.