

1. Find an equation of the tangent plane to the surface $z^2y = zx + x^2y^3 - 1$ at the point $(1, 1, 1)$. Use your equation to approximate the z -coordinate of the point on the surface with $x = 1.1$ and $y = 0.9$.
2. The mass and volume of a sample of copper are measured and used to calculate its density. If the relative errors in measuring the mass and volume are at most $\pm p\%$ and $\pm q\%$, respectively, approximate the maximum relative error in computing the density.
3. The length and width of a rectangle are measured to be L and W , with possible errors of at most ΔL and ΔW , respectively. Estimate the maximum possible error in the calculated area of the rectangle. Interpret your answer geometrically.
4. The dimensions of a rectangular box are measured to be L , W , and H , with possible relative errors of at most $\pm p\%$, $\pm q\%$, and $\pm r\%$, respectively. Estimate the maximum possible relative error in the calculated volume of the box.
5. You measure the dimensions of a box to be 30 cm, 40 cm, and 60 cm. What is the maximum possible error in your measurements in order that you be able to calculate the volume of the box with an error of at most 10 cm^3 ? Assume that the maximum errors in measuring each dimension are the same.
6. Use the appropriate linear approximation to estimate the amount of tin in a closed tin can with diameter 8 cm and height 12 cm if the tin is .04 cm thick. Is your estimate too high or too low? Try to answer this question without computing the actual amount of tin. Then compute the actual amount of tin and see if you were correct.