KNEWTON | alta

Differentials and Finding Error

Learning Objectives

- Compute a differential
- Estimate the amount of propagated and relative error using differentials

Compute a differential

1. Calculate the differential for $f(x) = 0.001x^4 - 0.01x^2 + 4x + 75$. Use the value of the differential at $x = 100$ to estimate the value of $x = 98$.

Estimate the amount of propagated and relative error using differentials

2. The radius of a spherical tank is estimated to be 9.5m $\pm$ 0.3m.
    a. Estimate the volume of the tank with differentials and calculate the propagated error.

b. What is the relative error of the volume?

ANSWER KEY

1. $dy = (0.004x^3 - 0.02x + 4)\Delta x$; $\Delta y \approx -8004$
2. a. $dV = (4\pi r^2)\Delta r$; $V = 3951.4 \pm 340.2$; b. 8.6%