

Calculus: Shear/Moment Diagrams

A 12-m long beam is subjected to a load, and the shear force V (N) is given by:

$$V(x) = 0.25x^2 + 5$$

where x is the distance along the beam. The bending moment M is given by:

$$M(x) = M_0 + \int_0^x V(x) \, dx$$

where the moment at the start of the beam is $M_0 = 0 \, Nm$.

- a) Calculate M at $x = 12 \, m$ using the [`integral\(\)`](#) function.
- b) Estimate M at $x = 12 \, m$ via the Composite Trapezoid Rule using 1, 2, 4, and 12 segments. Then, create a plot of both $V(x)$ and $M(x)$. You may find the [`cumtrapz\(\)`](#) function handy. Finally, compute (and plot) the percent error relative to the result from (a).