

You are given an axial loading model, M , that predicts the axial deformation of an object, $\delta(x)$, that results from applying a distributed load, $\omega(x)$. You are also informed that the model, M , is a linear system that satisfies the properties of superposition. Furthermore, you have been given the following deformations that result from applying two distinct loads to the object:

$$\delta_1(x) = M[\omega_1(x)]$$

$$\delta_2(x) = M[\omega_2(x)]$$

You must answer the following questions in terms of this given information.

- 1) If you apply twice the first load, $\omega_1(x)$, to the object, what does the model predict the deformation will be?

- 2) If you apply the two loads, $\omega_1(x)$ and $\omega_2(x)$, to the object at the same time in an additive way, what does the model predict the deformation will be?

- 3) If you apply a billion, 10^9 , times the first load, $\omega_1(x)$, to the object, what does the model predict the deformation will be?

- 4) With respect to the previous deformation prediction for a billion times the first load, $\omega_1(x)$, what are two real-world phenomena that might result in this being a poor prediction?