

Math 10B. Lecture Examples.

Section 8.4. Density and centers of mass[†]

Example 1 The density of a two-foot-long rod is $\delta = 2 + 6x$ (pounds per foot) at a distance x feet from one end. How much does it weigh?

Answer: [Weight] = 16 pounds

Example 2 Find the center of mass of the rod from Example 1 with density $\delta = 2 + 6x$ (pounds per foot) at x for $0 \leq x \leq 2$.

Answer: $\bar{x} = 1.25$ feet

Example 3 Show that if a rod has constant density, then its center of gravity is at its midpoint.

Answer: If the rod has constant density δ and extends from $x = a$ to $x = b$ with $a < b$, then its center of gravity is $\frac{1}{2}(b + a)$ and this is the midpoint of $[a, b]$.

Interactive Examples

Work the following Interactive Examples on Shenk's web page, <http://www.math.ucsd.edu/~ashenk/>:[‡]

Section 7.8: Examples 1 and 2

[†]Lecture notes to accompany Section 8.4 of *Calculus* by Hughes-Hallett et al

[‡]The chapter and section numbers on Shenk's web site refer to his calculus manuscript and not to the chapters and sections of the textbook for the course.