$\mathrm{ORIGIN} := 0$ beam length: $l := 9\ ft$ $x := 0\ ft, 0.1\ ft .. l$

Defined functions:

$$f(x, ws, we, zs, ze) := \left| \frac{(we - ws) \cdot \frac{ft^2}{kip}}{(ze - zs)} \right| \cdot x + ws \cdot \frac{ft^2}{kip}$$

$$A(x, ws, we, zs, ze) := \left| (ze - zs) \cdot \left| .5 \cdot (we + ws) \cdot \frac{ft^2}{kip} \right| \right|$$

$$x_{bar}(x, ws, we, zs, ze) := \frac{1}{A(x, we, ws, ze, zs)} \cdot \int_{zs}^{ze} x \cdot f(x, we, ws, ze, zs)\, dx$$

Number of distributed loads: $z := 1$ $zz := 0 .. z$ $zz = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ $ll_{zz} := l = \begin{bmatrix} 9 \\ 9 \end{bmatrix} ft$

Start Load	End Load	Load start from R1	Load end from R1
$ws_1 := 1\ \frac{kip}{ft}$	$we_1 := 0\ \frac{kip}{ft}$	$zs_1 := 0\ ft$	$ze_1 := 18\ ft$
$ws_2 := 1\ \frac{kip}{ft}$	$we_2 := 0\ \frac{kip}{ft}$	$zs_2 := 9\ ft$	$ze_2 := 11\ ft$

Vector definitions:

$ws = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} \frac{kip}{ft}$	$we = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \frac{kip}{ft}$	$zs = \begin{bmatrix} 0 \\ 0 \\ 9 \end{bmatrix} ft$	$ze = \begin{bmatrix} 0 \\ 18 \\ 11 \end{bmatrix} ft$
$ws_{zz} = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \frac{kip}{ft}$	$we_{zz} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \frac{kip}{ft}$	$zs_{zz} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} ft$	$ze_{zz} = \begin{bmatrix} 0 \\ 18 \end{bmatrix} ft$

Make sure loads don't extend past beam end

$$zs_{zz} := \mathrm{if}\left(zs_{zz} \le l, zs_{zz}, l\right) \qquad zs_{zz} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} ft$$

$$ze_{zz} := \mathrm{if}\left(ze_{zz} \le l, ze_{zz}, l\right) \qquad ze_{zz} = \begin{bmatrix} 0 \\ 9 \end{bmatrix} ft$$

Distributed load function

$f\left(x, ws_{zz}, we_{zz}, zs_{zz}, ze_{zz}\right) = ?$

Distributed load area

$$A\left(x, ws_{zz}, we_{zz}, zs_{zz}, ze_{zz}\right) = \begin{bmatrix} 0 \\ 4.5 \\ 0 \\ 4.5 \\ 0 \\ 4.5 \\ 0 \\ 4.5 \\ 0 \\ 4.5 \\ 0 \\ 4.5 \\ \vdots \end{bmatrix} ft^2$$

Location of centroid

$$x_{bar}\left(x, ws_{zz}, we_{zz}, zs_{zz}, ze_{zz}\right) = ?$$