QZ WK 08 | 03.12.2019 | base shear equation & moment frame analysis

1. This equation distributes the seismic forces to each of the levels for a ‘regular’ structure.

\[ F_{p_x} = \frac{(w_x \times h_x)}{n} V_{base} \]

\( w_x \) stands for what? weight of floor

\( h_x \) stands for what? height of floor (above ground)

\( F_{p_x} \) stands for what? seismic force (at that level (story force))

\[ \sum F_x = 0 = +100k - R_{ax} \]

\( R_{ax} = 100k \)

ans. pos. dir corr.

\[ \sum F_y = 0 = +40k - Ray \]

\( Ray = 40k \)

ans. pos. dir corr.

\[ \sum M_A = 0 = -100k(8ft) + Ma \]

\( Ma = 800\ k-ft \)

ans. pos. dir corr.

2. The single-bay moment frame resists 200k seismic force at the roof. The columns have fixed bases. As we did in lab, we cut the frame into sections and solve for the forces in each section (due to the assumption of hinges at inflection points). Segment A-B below has been solved partially. Please write out and use the equations of equilibrium solve for \( R_{ax} \), \( Ra_y \), and \( M_a \). (double-check dimensions -- verify the correct distance from A to B)

2. For analysis using portal frame method, what is the assumed moment at point B?

a) 10k-ft
b) 0

c) 1600 k-ft
d) 800 k-ft

3. What is the total shear force that the whole frame is resisting?

a) 200k
b) 100k
c) 40k
d) 0k
e) 16k