Assignment 4 (July 13, Submit in a week)
For the 3DOF system of Assignment 2, compute peak response displacement at the mass 1,2 and 3 based on the response spectrum method. Assume JMA Kobe ground motion.

1) Structural properties and assumptions

- Assume that

$$
\begin{aligned}
& m=150 \mathrm{kN} / \mathrm{g}=150 / 9.8 \\
& \xi_{r}=0.05 \\
& k_{1}=k \\
& k_{2}=2 k \\
& k_{3}=3 k \\
& k=3050.9 \mathrm{kN} / \mathrm{m}
\end{aligned}
$$

- Natural periods and mode shapes

$$
\begin{aligned}
& \omega_{1}=9.10 \mathrm{rad} / \mathrm{s} \quad T_{1}=0.690 \mathrm{~s} \\
& \omega_{2}=21.4 \mathrm{rad} / \mathrm{s} \quad T_{2}=0.294 \mathrm{~s} \\
& \omega_{3}=35.4 \mathrm{rad} / \mathrm{s} \quad T_{3}=0.177 \mathrm{~s} \\
& \phi_{1}=\left\{\begin{array}{c}
1.00 \\
0.584 \\
0.255
\end{array}\right\} \\
& \phi_{2}=\left\{\begin{array}{c}
-0.773 \\
1.00 \\
0.739
\end{array}\right\} \\
& \phi_{3}=\left\{\begin{array}{c}
0.122 \\
-0.645 \\
1.00
\end{array}\right\}
\end{aligned}
$$

- Modal matrix

$$
[\Phi]=\left[\begin{array}{ccc}
1.00 & -0.773 & 0.122 \\
0.584 & 1.00 & -0.645 \\
0.255 & 0.739 & 1.00
\end{array}\right]
$$

2) Compute response at mass 1,2 and 3 based on the RMS approximation of the response spectrum method following Eq. (9.79).
-Use the response displacement spectrum of JMA Kobe ground motion

