BE 601 HW 2 Problem 3

Part A $H = \begin{bmatrix} 1/2 & 0 & 0 & 0 & 0 \\ 1 & 1/2 & 0 & 0 & 0 \\ 1 & 1 & 1/2 & 0 & 0 \\ 1 & 1 & 1 & 1/2 & 0 \\ 1 & 1 & 1 & 1 & 1/2 \end{bmatrix}$

Part C

$$A = \int_0^2 \sin(\pi/2\, t)\, dt = \frac{2}{\pi}\int \sin u\, du \rightarrow -\frac{2\cos(u)}{\pi} \rightarrow -\frac{2\cos\left(\frac{\pi t}{2}\right)}{\pi}\Bigg|_0^2$$

$$-\frac{2}{\pi}\left[\underset{-1}{\cos\pi} - \underset{1}{\cos(0)}\right] = \frac{4}{\pi} \approx \underline{1.2732}$$

$$\frac{1/2\ y[4]}{1.2732} = \frac{1/2 \cdot 2.4142}{1.2732} = 0.9481 \longrightarrow \underline{94.81\%}$$