Assignment for CSN110 (based on lecture by Dr. Vinay Ribeiro)

Do the following in matlab.

1. Generate and plot $g(t) = A\cos(2\pi f_c t)$, where $f_c = 100$Hz, $A = 0.01$, and $t \in [0, 1]$.

2. Generate and plot in a new figure the noise signal $n(t)$. For each particular value of t, the noise $n(t)$ is random white Gaussian noise with standard deviation 1. Try using the function `randn`.

3. Plot in a new figure the sum $h(t) = g(t) + n(t)$ for $t \in [0, 1]$. Can you look at the plot visually and say whether the signal transmitted was $g(t)$?

4. Compute the correlation coefficient

$$c = \int_0^1 h(t)\cos(2\pi f_c t) dt$$

5. Depending on whether c is positive or negative, detect that the bit transmitted was zero or one respectively. Store this bit in some matlab vector.

6. Repeat the above steps 10,000 times and print the total number of times you (erroneously) detect that the bit transmitted was one.