(b) The Gibbs phenomenon describes the presence of ripples near the discontinuities of a signal. From our figure(b), we can see that there are ripples near the two discontinuities of the square wave, which matches the prediction of the Gibbs phenomenon. However, for any finite N, the peak amplitude of the ripples remains constant. Therefore, we can’t mitigate the Gibbs phenomenon by increasing our sampling points. Instead, we can only guarantee that the energy in the approximation error vanishes as we increase N to a large enough value.

(f) After applying the Hanning window function on our signal, we can see that the Gibb’s phenomenon is significantly reduced. The overshoots near the boundaries becomes insignificant. My speculation is that the end points of the data are forced to become equal or zero through weighting data points in between. Therefore, by choosing an optimal window function for the signal. We can significantly reduce the Gibb’s phenomenon.

—B08902073 資工一 陳宇浩

