ECE250: Signals and Systems

Quiz 7 (10/11/2022)
Max. Marks: 10

Note: Please Provide proper mathematical justifications with your answers. No marks will be awarded without a valid justification.

1. (CO4) (10 marks) Consider a signal $x(t)$ with Fourier transform $X(j\omega)$. Suppose we are given the following facts:

   (a) $x(t)$ is real and non-negative.
   (b) Inverse Fourier transform $\{(1 + j\omega)X(j\omega)\} = Ae^{-2t}u(t)$, where A is independent of t.
   (c) $\int_{-\infty}^{\infty} |X(j\omega)|^2 d\omega = 2\pi$

   Determine the closed-form expression for $x(t)$ and value of A.