Week 8 Assignment 8

1. Determine the probability of:
   a. A coin being biased and tails being more likely
   b. A coin being fair and tails being more likely
   c. A coin being biased and heads being more likely
   d. A coin being fair and heads being more likely

2. If x and y are uncorrelated random variables, then which of the following statements is true?
   a. x and y are independent
   b. x and y are dependent
   c. x and y are not dependent or uncorrelated
   d. x and y are independent

3. The correlation function of a waveguide tap, $\Gamma(z)$, is shown below.

   ![Image of the correlation function of a waveguide tap, $\Gamma(z)$](image)

   - The value of $\Gamma(0)$ is:
     a. 0
     b. 1
     c. Some of these
   - Show whether the following statements are true or false:
     a. The following function is a valid correlation function of a waveguide tap, $\Gamma(z)$:
     b. Check the validity of the power spectral density.
     c. False
   - Determine the two-sided exponential power r.m.s. noise to infinite $\Gamma(z) = 0 = \Gamma'(z) = \frac{1}{\lambda} \exp(-\frac{|z|}{\lambda})$ where $\exp(z)$ is the exponential and $\lambda$ is a constant with unit probability. The process is:
     a. Power correlation
     b. Second-order stationary
     c. With mean stationary
     d. No stationary in any sense
   - Experiment with power spectrum density:
     a. $\Gamma(z)$
     b. $\Gamma'(z)$
   - Consider a random process $X(t)$: a random variable $X$ of a random variable and $x(t)$ is a deterministic function of time. $X(t)$ is:
     a. Ornstein–Uhlenbeck
     b. Gaussian
     c. Cannot be determined
     d. None of these
   - Experiment with $X(t)$ and $x(t)$ and explain the result:
     a. $\Gamma(x(t))$
     b. $\Gamma'(x(t))$
     c. $\Gamma(x(t))$ cannot be determined

4. Determine the waveguide tap's correlation function: $\Gamma(z)$.