1. The message signal \( m(t) \), whose Fourier transform \( M(f) \) is shown in the figure below, is to be transmitted from Point A to Point B. We know that the signal is normalized, meaning that \(-1 \leq m(t) \leq 1\).
   a. If USSB is employed, what is the bandwidth of the modulated signal?
   b. If DSB is employed, what is the bandwidth of the modulated signal?
   c. If an AM modulation scheme with \( a = 0.8 \) is used, where \( a \) is the index of modulation, what is the bandwidth of the modulated signal?
2. A power meter that measures average power is connected to the output of a transmitter as shown in the figure below. The meter reading is 20 Watts when it is connected to a 50 Ω load. Determine
   a. The voltage across the load resistance.
   b. The current through the load resistance.
   c. The power level in dBm units.
3. A signal can be modeled as a low-pass stationary process $X(t)$, whose probability density function at any time $t_0$ is shown in the figure below. The bandwidth of this process is 5 kHz, and we desire to transmit it using a PCM system.
   a. If sampling is done at the Nyquist rate and a uniform quantizer with 32 levels is employed, what is the resulting SQNR?
   b. What is the resulting bit rate?
   c. If the available bandwidth is 40 kHz, what is the highest achievable SQNR?
1. PS3.20
2. PS6.17
3. PS7.16