# Chapter 2: Exercises for digital modulation (Solutions)
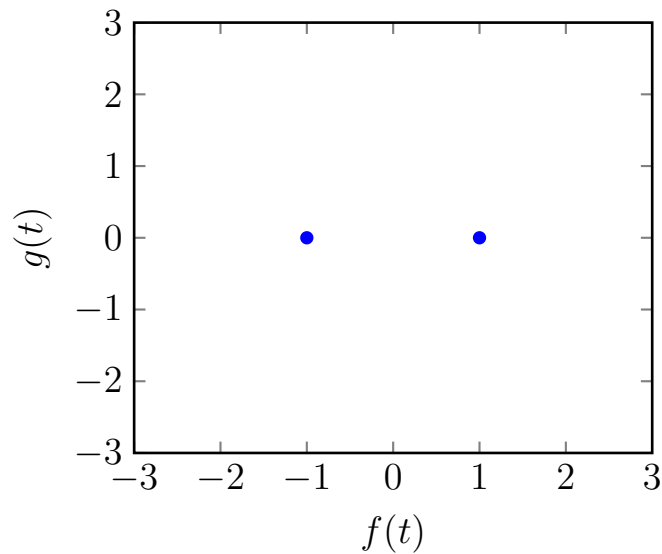
## Prof. Kejie Lu
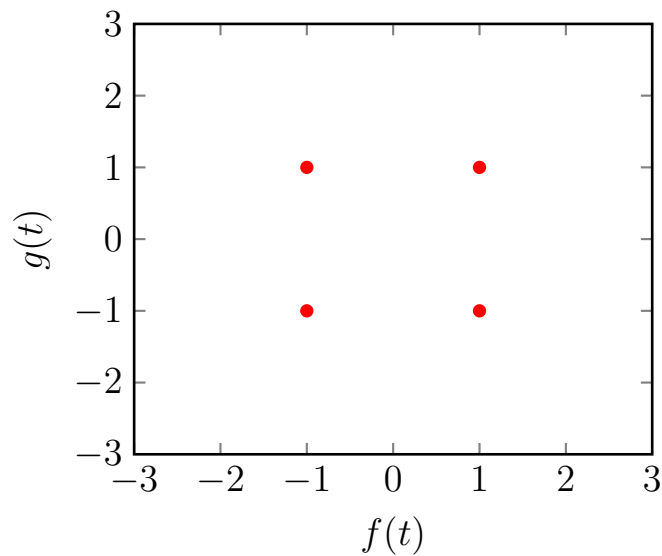
1. Draw the constellation of digital modulation scheme BPSK.
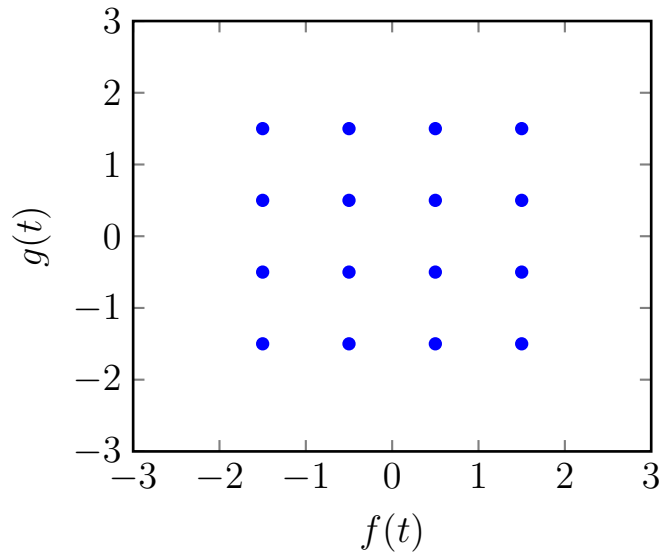
   **Solution:**

   

2. Draw the constellation of digital modulation scheme QPSK.

   **Solution:** see slide 67.

3. Draw the constellation of digital modulation scheme 16QAM.

   **Solution:** see slide 67.



4. A communication system can send symbols with rate 3000 baud. What are the data rates of the system if it is using digital modulation schemes BPSK, QPSK, and 16QAM, respectively?

   **Solution:**

   If BPSK is used, each symbol carries 1 bit, so the data rate is $3kbps$.

   If QPSK is used, each symbol carries 2 bit, so the data rate is $6kbps$.

   If 16QAM is used, each symbol carries 4 bit, so the data rate is $12kbps$.

5. If two BPSK signals are generated using the same settings, then the sum of them is a new signal. Draw the constellation for the new signal.

   **Solution:**