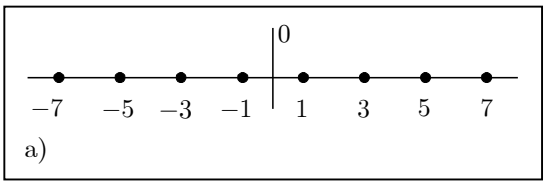
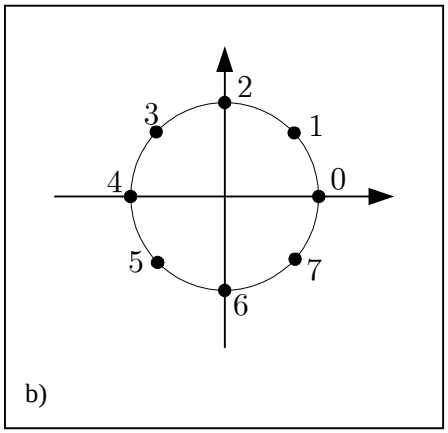
S-72.341 CODING METHODS

Tutorial 10

1. (Wicker, problem 15.1) Construct a partition tree for the following signal constellations and compute the inter-signal distances at each level of partition tree.



2. Over the channel is transmitted symbols from 8-psk constellation.



   a) Select ½ rate Ungerboeck encoder for two state and four state trellis code modulation with spectral efficiency 2 bits/sec/Hz.

   b) Construct and label a trellis diagram for both encoders.

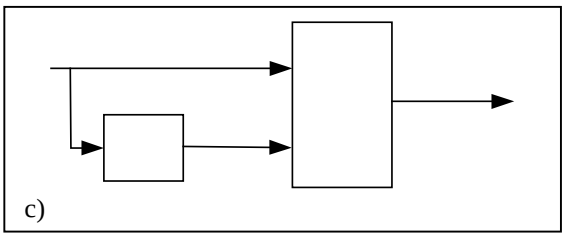
   c) Determine the squared minimum free distance and asymptotic coding gain for the system.

3. By using both encoders from previous exercise:

   a) Code information bit sequence $[1,0,0,1,1,0,1,1,1,0]$.

   b) Draw the path trough the trellis for both encoders.

4. (Wicker, problem 15.4) The following two-state encoder (figure c) and 8-AM signal constellation (figure a) is to be used to construct a TCM system that provides 2 bit/sec/Hz. Complete the steps listed below.



a) Label the signals, and compute the squared inter-signal distances and average signal energy.

b) Determine the appropriate partitions for the signal constellation.

c) Construct and label a trellis diagram for the system.

d) Determine the squared minimum free distance and asymptotic coding gain for the system relative to an uncoded 4-AM system.

If you find errors in any of the exercises or the solutions, please inform the assistants (kalle.ruttik@hut.fi, jari.salo@hut.fi). Good luck to the exam!!