Exercises of lecture  
Mobile Ad Hoc Networks  
Summer 2007  
Sheet 5

SECTION 1:  
Optimal Energy Path

1. Given the following four set of points, draw the corresponding Gabriel Graphs.

Solution:
2. Given the unit disk graph shown in the figure below, construct the optimal energy path between the source and destination node based on *Gabriel Graph*. Once the path is constructed, compute the total energy consumption to transmit *p* bits of data from node A to K.

**Solution:**

Based on Gabriel Graph, two paths exist. They are A-B-C-D-F-G-H-J-K and A-B-C-D-F-H-J-K. The optimal energy path for the source node A and destination node K is A-B-C-D-F-H-J-K.

Total energy consumption, $E_{total} = e_{tx} \cdot p \cdot \sum_{i=1}^{m} d_i^\alpha$ where *m* is the total number of links in the path, *i* is the link number, $e_{tx}$ is the energy required to transmit one bit data over the distance of one meter in the power amplifier of transceiver. Depending on the transceiver sensitivity, the value of $e_{tx}$ ranges from some pico- to nano-Joule per bit per meter$^\alpha$.

$\alpha$ is called the path loss exponent of the transmission medium that ranges from 2 to 6, while *i* represent the link that forms the shortest path up to link *m*. 