Solutions to Final Exam. of Mobile Computing

1. (12 points) Omitted.

2. (6 points) 12, 13, 16, 19, 21, 25, 27.

3. (10 points) The distances from the six co-channel base stations in terms of cell radius are $\sqrt{13}$, $4$, $\sqrt{19}$, $5$, $\sqrt{28}$, and $\sqrt{31}$. Therefore, the C/I is

$$\frac{1}{\sqrt{13}^3 + 4^{-3} + \sqrt{19}^{-3} + 5^{-3} + \sqrt{28}^{-3} + \sqrt{31}^{-3}} = 14.37.$$  

4. (a) (6 points) the capacity is $1/4*1.25 \text{ MHz} / 9.6 \text{ kHz} * 2.75 * 2/1.67 = 107 \text{ (or 108)}$ users per cell.

(b) (10 points)

CSMA/CD works as follows: if a collision is detected during the transmission, the terminal aborts its transmission immediately and the terminal attempts to transmit later after waiting for a random time. CSMA/CD is mainly used in wired networks, e.g., Ethernet.

CSMA/CA does not abort the transmission but tries to avoid collisions in advance. CSMA/CA is used in wireless networks, e.g., WLAN.

5. (a) (10 points) See Fig 7.16 on page 149 of the reference textbook, i.e., the eight codes are (0, 0, 0, 0, 0, 0, 0, 0), (0, 1, 0, 1, 0, 1, 0, 1), (0, 0, 1, 1, 0, 0, 1, 1), (0, 1, 1, 0, 0, 1, 1, 0), (0, 0, 0, 1, 1, 1, 1, 0), (0, 1, 0, 1, 1, 1, 0, 0), (0, 0, 1, 1, 1, 1, 0, 0), (0, 1, 1, 0, 1, 0, 0, 1).

(b) (10 points) Handoff means that a MS is moving from one cell to another within the same carrier, while roaming means that a MS is moving from one cell to another belonged to different carriers.

(c) (12 points) See the solution to problem 1 of problem set 3.

6. (12 points) See the solution to problem 5 of problem set 3.

7. (12 points) See the solution to problem 1 of problem set 4.