Christian Schindelhauer   Freiburg, the 2nd June, 2016
                                                    Discussion 8th June, 2016

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Exercise for the lecture

Wireless Sensor Networks

Summer 2016

Sheet 6

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EXERCISE 7:
Consider aggregation in wireless sensor network with a routing tree. The sensor information of
sensor i is called $x_i \in \mathbb{R}$ and $z_i \in \mathbb{Z}$ for the sensor set $\{1, \ldots, n\}$.

1. Which of the following functions can be easily aggregated?

2. What calculation has to be done at a router?

3. What information is passed from nodes to nodes?

4. How to collect the data if aggregation is not possible?

Answer these questions for the following outputs.

a) $y_1 = \frac{1}{n} \sum_{i=1}^{n} (x_i - \frac{1}{n} \sum_{j=1}^{n} x_j)^2$

b) $y_2 = \sum_{i=1}^{n} z_i \bmod 3$

c) $y_3 = \sum_{i=1}^{n} (x_i - x_{n+1-i})^2$

d) y_4 is the number of sensor nodes where z_i is larger than 10.

e) y_5 is the third largest value x_i

f) $y_6 = \begin{cases} x_{\min\{z_1,\ldots,z_n\}}, & \min\{z_1, \ldots, z_n\} \in \{1, \ldots, n\} \\ x_n, & \text{else} \end{cases}$

g) y_7 is a random value x_i chosen uniformly at random from values $(x_1, \ldots, x_n)$.

h) $y_8 = \prod_{i=1}^{n} z_i$

i) $y_9 = $ sorted list of all elements $(z_1, \ldots, z_n)$

j) $y_{10} = $ longest distance of a node to the base station.