Exercise 1
Prove by giving an algorithm that, for caterpillars of hair length 1, a 2-approximation to the number of wavelengths needed for routing along a set of given paths (i.e. $w(G'_R)$) can be computed in polynomial time.
(Again, each direction of an edge can simultaneously be used by at most one path of the same wavelength.)

Hint: Try to merge the ideas behind the algorithms for paths and stars. You need to make significant changes to the algorithm for stars.

Exercise 2
Give an optimal algorithm for min-broadcast ($\text{minb}(G)$) on a line graph and prove its time requirement under the above mentioned communication model.

Exercise 3
For a complete binary tree with $n$ leaf nodes, give a min-broadcast algorithm that will run in no more than $\log n + 1$ time steps under the above mentioned communication model.

Exercise 4
Can one derive an optimal min-broadcast algorithm for general, connected graphs with $2^k$ nodes from the previous two exercises? Explain by giving an example why the strategies used above will fail.

Bonus Exercise 5
Gossip on cycles.
Slides: 8:21 to 8:26 (Handout)

Bonus Exercise 6
Gossip with Telephone-Mode.
Slides: 8:32 to 8:39 (Handout)

Bonus Exercise 7
Gossip with Telegraph-Mode.
Slides: 8:40 to 8:53 (Handout)
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**Deadline:** The solutions are to be handed in until **January 08, 18:00**, in the lecture or at the drop boxes at the Chair i1.