Reminder: You may work in groups and use outside sources. But, you must write up solutions in your own words and properly reference your sources for each problem. This includes listing your collaborators and properly citing any sources you use. Solutions to each problem must be electronically typeset and submitted online via Gradescope. Instructions appear in the E-Homework Guide: [http://www.cse.wustl.edu/~bjuba/cse347/s20/ehomework/](http://www.cse.wustl.edu/~bjuba/cse347/s20/ehomework/)

1. *Kleinberg & Tardos* Chapter 6, question 24

2. You are layout editor for Town & Style Magazine, a “luxury lifestyle magazine serving the St. Louis metropolitan area.” You are given a collection of $n$ news articles $a_1 \ldots a_n$, such that article $a_i$ occupies $\ell_i$ column inches. After laying out all the ads for the paper, you are left with $n$ slots $s_1 \ldots s_n$, such that $s_j$ can hold a news article of up to $m_j$ column inches.

   Any article can be run in any slot. However, if an article is too long for its slot, some text must be cut to make it fit; if the article is too short, you must paste in some random content from Wikipedia to make it long enough to fill the whole slot. Neither change is desirable; it is best to run an article in a slot that is the right size for it.

   Give an $O(n \log n)$-time algorithm to assign articles to slots so as to minimize the total change required for all articles. If $a_i$ is assigned to $s_j$, the change required for $a_i$ is $|\ell_i - m_j|$.

3. A bunch of telecommunications stations are located on the boundary of a circle. Starting from some arbitrary station $s_1$, the stations are numbered consecutively $s_1 \ldots s_n$ in the clockwise direction.

   Various pairs of stations want to communicate with each other. A pair of stations can communicate via a laser beam shot in a straight line (i.e. a chord of the circle) between them. A station can communicate with only one other station at a time, and **two pairs of stations cannot communicate simultaneously if their laser beams would cross** – doing so would corrupt both pairs’ messages.

   Say that communication between stations $s_i$ and $s_j$ has priority $\pi_{ij}$. Give a polynomial-time algorithm to select a subset of pairs of stations that can communicate simultaneously, such that the total priority of their communication is maximized.