Orthogonal line segment intersection. Given a set of $N$ horizontal and vertical line segments, develop and analyze a cache-oblivious algorithm to find the number of vertical segments intersecting each horizontal segment in $O\left(\frac{N}{B} \log_{M/B} \frac{N}{B}\right)$ memory transfers. You may assume that the endpoints of any two different line segments do not have the same $x$ or $y$ value.

Line segment visibility from a point. Given a set of $N$ line segments and a point $p$, we would like to find the clockwise list of partial line segments visible from $p$. A (partial) line segment is visible from $p$ if, for any point along the segment, a line can be drawn from that point to $p$ without intersecting any other line segment. If a line segment is only partially visible from $p$, then only the segment that is visible should appear in the output list. A single line segment may contain many partial segments in the output list. Develop and analyze a cache-oblivious algorithm to accomplish this in $O\left(\frac{N}{B} \log_{M/B} \frac{N}{B} + \frac{K}{B}\right)$ memory transfers, where $K$ is the size of the output. You may assume that no two points in the input lie along the same line to $p$, and that no two line segments intersect.