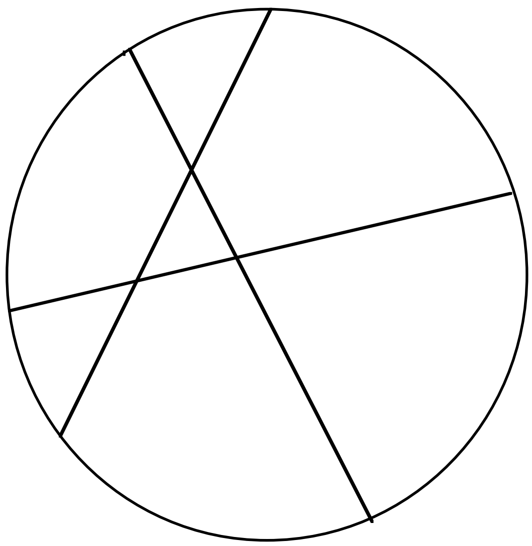
Math 215 - Spring 2013 - Homework Number 4.
This assignment concentrates on Chapters 6 - 9 of Eccles.

1. Eccles, page 73, problems 6.4, 6.5, 6.6, 6.7.
2. Eccles, page 86, problems 7.5, 7.6, 7.7.
3. Eccles, page 99, problems 8.2, 8.3.
4. Eccles, page 113, problems 9.1, 9.3. 9.4, 9.5.

5. Reconsider straight lines cutting a disk.



For example, three lines divide the disk into seven regions when the lines each intersect the other lines once.
You have previously shown that n lines divide the disk into $R(n)$ regions where $R(0) = 1$, $R(1) = 2$, $R(2) = 4$, $R(3) = 7$ and $R(n+1) = R(n) + (n + 1)$ for all $n = 0,1,2,\ldots$. You have also proved that $R(n) = 1 + n(n + 1)/2$.
Now go back to the beginning in this problem and find a formula $I(n)$ for the number of intersection points between the n lines (you do not count the intersections of the lines with the boundary of the disk) when they are positioned so that every line intersects each of the other lines once. To get you started, note that
$I(0) = 0$, $I(1) = 0$, $I(2) = 1$, $I(3) = 3$.
Find a formula for $I(n)$ and prove your result.

6. Eccles page 115, problems 2, 4, 6, 8, 9, 18.