Math 215 - Assignment Number 6, Spring 2013

Read Chapters 10,11,12,13,14. Read the notes on sets by Rudin that we have on our website. Read also the supplementary notes on infinite sets from the website.

A. Eccles page 57. Problem Number 26. Please handle this problem in the following way. Regard the dvision of the circle into regions as forming a graph whose nodes consist in the given n points on the circle and also the intersection points of the line segments with one another. This graph is then a planar graph with $f(n) = R(n) + 1$ regions where $R(n)$ denotes the number of regions into which the interior of the circle has been divided. You should be able to find and prove a formula for $e(n)$, the number of edges in this graph, and $v(n)$, the number of nodes in this graph. You can then use Euler's formula, $v(n) - e(n) + f(n) = 2$, to determine a formula for $R(n)$. Carry out this project.

B. Eccles.

1. Page 132, problem 10.3
2. Page 155, Problems 12.2, 12.5, 12.7
3. Page 169, Problem 13.5
4. Page 181, Problems 14.1, 14.2
5. Page 184, Problems 11, 12, 13, 19, 28.

C. The following is a "proof" that $1 = 0$. What is wrong with this proof?

$$
\begin{aligned}
0 \\
&= 0 + 0 + 0 + \cdots \\
&= (1 - 1) + (1 - 1) + (1 - 1) + \cdots \\
&= 1 - 1 + 1 - 1 + 1 - 1 + 1 - 1 + \cdots \\
&= 1 + (-1 + 1 - 1 + 1 - 1 + 1 - 1 + \cdots) \\
&= 1 + (-1 + 1) + (-1 + 1) + (-1 + 1) + (-1 + 1) + \cdots \\
&= 1 + 0 + 0 + 0 + 0 + \cdots \\
&= 1.
\end{aligned}
$$