MAT1830 - Discrete Mathematics for Computer Science
Assignment #10
To be handed in at the beginning of your support class in week 12 (22 – 26 May)

1. Rewrite the following expressions without using $\sum$ or $\prod$.

   (a) $\displaystyle\sum_{i=1}^{5} \frac{2}{4i-3}$

   (b) $\displaystyle\prod_{i=4}^{7}((z+i)^i - 3i)$

2. Rewrite the following expressions using $\sum$ or $\prod$ notation.

   (a) $x(x-1)(x-4)(x-9)(x-16)\cdots(x-900)$

   (b) $\frac{1}{6^4} + \frac{1}{9^5} + \frac{1}{12^6} + \frac{1}{15^7} + \cdots + \frac{1}{33^{13}}$

3. For each integer $n \geq 1$, let t_n be the number of strings of n letters that can be produced by concatenating (running together) copies of the strings "a", "bb", and "cc".

   For example, $t_1 = 1$ ("a" is the only possible string) and $t_2 = 3$ ("aa", "bb" and "cc" are the possible strings).

   (a) Find t_3 and t_4.

   (b) Find a recurrence for t_n that holds for all $n \geq 3$. Explain why your recurrence gives t_n.

4. Draw simple graphs with the following properties or explain why they do not exist.

   (a) The list of vertices is: P, Q, R, S, T and the list of edges is PQ, PS, QR, QS, RT.

   (b) The graph has 11 vertices and 56 edges.

   (c) The graph has 8 vertices and 7 edges and is connected[1].

   (d) The graph has 7 vertices and 11 edges and its vertices can be divided into two sets in such a way that every edge joins a vertex in one set to a vertex in the other.

[1] *Connected* means that you can "walk" from any vertex to any other vertex along the edges. It is defined formally in lecture 30.