

Name .....

1.	2.	3.	4.	$\Sigma$ .

1. Use generating functions to find  $a_n$  if:  $a_n = a_{n-1} + 2 \cdot 3^{n-1}$  for  $n \geq 1$  and  $a_0 = 2$ .
2. Consider the Hamming code with the following generator matrix:  $\begin{bmatrix} 110101 \\ 011110 \\ 111000 \end{bmatrix}$ . Find the parity check matrix. What was sent if at most one error has arisen during the transmission and the received word is a) 101010, b) 001101?
3. Give short, nice and formal proof for the theorem: if  $|G| \geq 3$  then  $1 \leq \delta(G) + \delta(\overline{G}) \leq |G| - 1$ .
4. Give short, nice and formal proof for the theorem: a tree  $T$  without a vertex of degree 2 has more leaves than other vertices.