

Foundations of Discrete Mathematics
COT 2104

Practice 7

1. Write the following sum without using \sum and evaluate.
$$\sum_{k=1}^4 (2k^2 - k + 1)$$
2. Use mathematical induction to prove the truth of each of the following assertions for all $n \geq 1$.
 - a) $8^n - 3^n$ is divisible by 5.
 - b) $10^{n+1} + 10^n + 1$ is divisible by 3.
3. Use mathematical induction to establish the following formula.
$$\sum_{i=1}^n (2i - 1)(2i) = (n(n+1)(4n - 1)) / 3$$
4. Give recursive definitions of the following sequence:
 - a) 4, 1, 3, -2, -3, 5, -7, 12, -19, 31, ...
5. Solve the recurrence relation $a_{n+1} = 7a_n - 10a_{n-1}$, $n \geq 2$, given $a_1 = 10$, $a_2 = 29$.
6. Express the generating function of the following sequence as a polynomial
 - a) 1, -2, 3, -4 ...
7. The first two terms of a sequence are 6 and 2. If the sequence is arithmetic, find the 27th term and the sum of the first 30 terms.