Induction Review Sheet

Prove the following using mathematical induction.

1) $1+4+7+...+(3n-2) = \dfrac{n(3n-1)}{2}$

2) $\dfrac{1}{3}+\dfrac{1}{15}+\dfrac{1}{35}+...+\dfrac{1}{4n^2-1} = \dfrac{n}{2n+1}$

3) Prove that $\displaystyle\sum_{a=1}^{n}(2a)^3 = 2n^2(n+1)^2$

In problems 4-5, write out the first few terms of the sequence and suggest and prove a formula in terms of n for the nth term of a_n.

4) Given:
$$a_1 = 2$$
$$a_n = 3a_{n-1}+2$$

5) Given:
$$a_1 = \dfrac{1}{2}$$
$$a_n = \dfrac{n}{n+1}(a_{n-1}+1)$$

In problems 6-7, write out the first few terms of the sequence and suggest and prove a formula in terms of n for the nth partial sum S_n.

6) $\displaystyle\sum_{a=1}^{n}9\bullet10^{a-1}$

7) Given:
$$a_1 = 1$$
$$a_n = 2n-1$$