Name: _____

Show your work.

1. Use mathematical induction to establish that for every positive integer n:

$$\sum_{i=1}^{n} \frac{1}{(4n+1)(4n-3)} = \frac{n}{4n+1}.$$

2. Use mathematical induction to establish that $7^n - 2^n$ is divisible by 5 for every positive integer n.

3. Consider the sequence $(s_n)_{n=0}^{\infty}$ for which $s_0 = s_1 = 1$ and for every integer $n \geq 2$:

$$s_n = s_{n-1} + 2s_{n-2}.$$

   (a) Calculate the value of s_6.
   (b) Prove that all terms of the sequence $(s_n)_{n=0}^{\infty}$ are odd.

4. Consider the sequence $(t_n)_{n=0}^{\infty}$ for which $t_0 = 2$ and $t_1 = 1$ and for every integer $n \geq 2$:

$$t_n = t_{n-1} + t_{n-2}.$$

   (a) Calculate the values of t_6.
   (b) Give an explicit formula for t_n.