Worksheet 6

Math 2604

Spring 2015

1. Let $f(x) = \frac{x}{\sqrt{1+x^2}}$, $f_1(x) = f(x)$, and for $n \geq 2$, $f_n(x) = f(f_{n-1}(x))$. Find the terms $f_2(x)$ and $f_3(x)$. Guess a formula for $f_n(x)$ and justify your answer.

2. Give a recursive definition of the following sequence: $1, 2, 6, 24, 120, 720, ...$, find a formula for a_n, and prove that your formula is correct.

3. Give a recursive definition of the following sequence: $1, 5, 17, 53, 161, ...$, find a formula for a_n, and prove that your formula is correct.

4. Give a recursive definition of the following sequence: $2, \frac{2}{3}, \frac{1}{3}, \frac{1}{5}, \frac{2}{15}, \frac{2}{21}...$, find a formula for a_n, and prove that your formula is correct.

5. Solve the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2}, n \geq 2$, given $a_0 = 2, a_1 = 11$.

6. Solve the recurrence relation $a_n = -6a_{n-1} - 9a_{n-2}, n \geq 2$, given $a_0 = 1, a_1 = -4$.