# Generalized Fibonacci

Premchand S. Nair
pnair@miu.edu

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## Introduction

In this short note,a generalized version of Fibonacci series is presented along with its closed form solution. Define

$$G(n) = pG(n-1) + qG(n-2),$$

$p > 0, q > 0$ and $n \geq 0$.

Following steps similar to those we did today in the class you can show

$$G(n) = \frac{1}{p^2+4q}\left(\left(\frac{p+\sqrt{p^2+4q}}{2}\right)^n - \left(\frac{p-\sqrt{p^2+4q}}{2}\right)^n\right).$$