

## Assignment 2

- 1.1 Use induction to prove  $F_i = \frac{\phi^i - \hat{\phi}^i}{\sqrt{5}}$ ; where  $F_i = F_{i-2} + F_{i-1}$ , and  $\phi$  is the golden ratio  $\frac{1+\sqrt{5}}{2}$ .

Proof by induction is used to show that an expression  $f_n$  (typically a recursive function) is true; in practice, it is a two step process involving a calculation followed by a set of algebraic steps applied to the expression being proved.

To prove by induction, write out the expressions  $f_n$  and  $f_{n+1}$  (note:  $f_{n+1}$  is the same as  $f_n$ , but with  $(n+1)$  substituted everywhere in place of  $n$ ). Next, write out  $f_{n+1}$  to have atleast one term equivalent to  $f_n$ . If you can transform the expression  $f_{n+1} = f_n + \dots$