

The following assignment is due on February 2nd at 9:00 am. Please show all your work on a separate piece of paper.

- Let F_n be the n th Fibonacci number. That is $F_1 = 1$, $F_2 = 1$ and $F_n = F_{n-1} + F_{n-2}$. Write out the 6 terms of the following sequences.

(a) $u_n = 5F_n$

(b) $u_n = 2F_{n+1} - F_n$

Show that both the sequences above are approximately geometric when n is large and evaluate the approximate growth factor.

- Given that the golden ratio ϕ satisfies the equation $\phi^2 = 1 + \phi$ Show, by multiplying both sides of this equation by ϕ that:

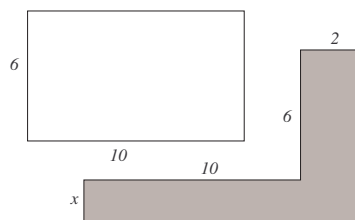
(a) $\phi^3 = 2\phi + 1$

(b) $\phi^4 = 3\phi + 2$

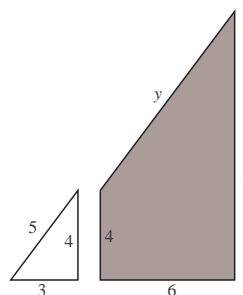
(c) $\phi^5 = 5\phi + 3$

Write down an expression for ϕ^n in terms of Fibonacci numbers, F_n .

- Find the value of x so that the shaded area is a gnomon to the rectangle.



- Find the values of x and y so that the shaded area is a gnomon to the white triangle.



- Let ABCD be an arbitrary rectangle as shown in the figure on the right. Let AF be perpendicular to the diagonal BD and EF perpendicular to AB. Show that the rectangle BCEF is a gnomon to the rectangle ADEF.

