

$$u_{n+2} = u_{n+1} + u_n$$

So,

$$\frac{u_{n+2}}{u_{n+1}} = \frac{u_{n+1}}{u_{n+1}} + \frac{u_n}{u_{n+1}}$$

$$\frac{u_{n+2}}{u_{n+1}} \rightarrow \phi \text{ as } n \rightarrow \infty$$

$$\frac{u_n}{u_{n+1}} \rightarrow \frac{1}{\phi} \text{ as } n \rightarrow \infty$$

$$\phi = 1 + \frac{1}{\phi}$$

$$\phi^2 = \phi + 1$$

$$\phi^2 - \phi - 1 = 0$$

$$\phi = \frac{(1 \pm \sqrt{5})}{2}$$

$$\phi \neq \frac{1}{2}(1 - \sqrt{5})$$

Since the ratio of consecutive positive terms cannot be negative. So only positive result valid, as given.

M1

M1

M1

M1

M1

M1

A1
Must include
valid
reasoning for
discounting
the negative
results

[7]

[7 marks]