

**Section 1: Introduction to complex numbers****Exercise level 3**

1. Simplify  $\frac{1}{1 - \frac{1}{1 + \frac{1}{1-i}}}$ .

2. (i) Find  $(i+1)^2$ ,  $(i+1)^3$  and  $(i+1)^4$ .  
(ii) Hence simplify  $(i+1)^{3600} - (i-1)^{3600}$ .

3. (i) Find  $i^2$ ,  $i^3$  and  $i^4$ .  
(ii) Let  $S = i^n + i^{-n}$ , where  $n$  is a positive integer. Find all possible values of  $S$ .