

15.  $a_n = (-1)^n \frac{n-1}{n}$  for all integers  $n \geq 2$

44. When  $i = n$ ,  $j = n - 1$ . When  $i = 2n$ ,  $j = 2n - 1$ . Since  $j = i - 1$ , then  $i = j + 1$ . So

$$\frac{n - i + 1}{i} = \frac{n - (j + 1) + 1}{j + 1} = \frac{n - j}{j + 1}. \text{ Therefore, } \prod_{i=n}^{2n} \left( \frac{n - i + 1}{i} \right) = \prod_{j=n-1}^{2n-1} \left( \frac{n - j}{j + 1} \right).$$