6. (i) Prove by induction that for $n \in \mathbb{Z}^+$

$$\sum_{r=1}^{n} (3r + 1)(r + 2) = n(n + 2)(n + 3)$$

(6)

(ii) Prove by induction that for all positive **odd** integers n

$$f(n) = 4^n + 5^n + 6^n$$

is divisible by 15

(6)