4 Let $w_r = r(r+1)(r+2)\ldots(r+9)$.

(a) Show that

$$w_{r+1} - w_r = 10(r+1)(r+2)\ldots(r+9). \qquad [2]$$

(b) Given that $u_r = (r+1)(r+2)\ldots(r+9)$, find $\sum_{r=1}^{n} u_r$ in terms of n. [3]

(c) Given that $v_r = x^{w_{r+1}} - x^{w_r}$, find the set of values of x for which the infinite series

$$v_1 + v_2 + v_3 + \ldots$$

is convergent and give the sum to infinity when this exists. [3]