

2. (a) For the binomial expansion of $\frac{1}{(1-x)^2}$, $|x| < 1$, in ascending powers of x ,

(i) find the first four terms,

(ii) write down the coefficient of x^n .

(2)

(b) Hence, show that, for $|x| < 1$, $\sum_{n=1}^{\infty} nx^n = \frac{x}{(1-x)^2}$.

(2)

(c) Prove that, for $|x| < 1$, $\sum_{n=1}^{\infty} (an+1)x^n = \frac{(a+1)x - x^2}{(1-x)^2}$, where a is a constant.

(4)

(d) Hence evaluate $\sum_{n=1}^{\infty} \frac{5n+1}{2^{3n}}$.

(2)