5. (a) Find the limit as $n \to \infty$, when one exists, or prove it does not exist, for the sequences with nth term: [5]

i.

$$a_n = \frac{1 - n + n^3}{1 - 2n^3}$$

ii.

$$a_n = \frac{1 + 3^n}{1 - 3^n}$$

iii.

$$a_n = \frac{1 - n^3}{n^2}$$

(b) Does the infinite series $\sum^{\infty} \frac{1}{}$ converge or diverge? Prove your answer. [3]