3. [8 points]

a. [5 points] Show that the following limit converges and compute the limit. Fully justify your answer including using **proper limit notation**.

$$\lim_{n\to\infty} n^2\left(1-\cos\left(\frac{1}{n}\right)\right)$$

Answer: _____

b. [3 points] Use part **a.** to determine if the following series converges or diverges, and circle the corresponding word. **Fully justify** your answer including using **proper notation** and showing mechanics of any tests you use.

$$\sum_{n=1}^{\infty} n^2\left(1-\cos\left(\frac{1}{n}\right)\right)$$

Circle one: **Converges** **Diverges**

Justification: