1. For each of the following sequences, state whether it converges or diverges. If it converges, give its limit.

   \[ s_n = (0.99)^n \]

   converges to 0 since 0.99 < 1.

   \[ s_n = \frac{2n^2 - n + 7}{7 - n^2} \]

   converges to \( \frac{2}{-1} = -2 \)

   \[ s_n = \frac{\sin(n)}{n} \]

   \( \sin(n) \) is always between -1 and 1 and 1/n converges to 0, so \( s_n \) converges to 0.

2. Find the sum of the following

   \[ 1 - x^2 + x^4 - x^6 + x^8 - \cdots, \quad \text{for} \quad x^2 < 1 \]

   Its a geometric series and converges to

   \[ \frac{1}{1 - (-x^2)} = \frac{1}{1 + x^2} \]

   \[
   \sum_{n=1}^{20} \frac{1}{3^n} = \frac{1}{3^4} \sum_{n=0}^{16} \frac{1}{3^n} = \frac{1}{3^4} \frac{1 - \frac{1}{3^{17}}}{1 - 1/3} \\
   = \frac{1}{3^4} \frac{3}{2} \left(1 - \frac{1}{3^{17}}\right) = \frac{1}{54} \left(1 - \frac{1}{3^{17}}\right)
   \]