Problem 1:

  (i) Find the first 5 terms of the sequence $a_n = \sin(1/n)$.

  (ii) Give a formula for the following sequence: $3, 7, 15, 31, 63, \ldots$

Problem 2: Find the limit of the following sequences. If the sequence does not converge, write DNE.

  (i) $a_n = \dfrac{7n^4 - 2n^2 - n}{3n^4 - n^3 + 9n^2}$ _____

  (ii) $a_n = \dfrac{\ln(12n)}{5n}$ _____

  (iii) $a_n = \cos(\pi n) - \dfrac{1}{n^4}$ _____

  (iv) $a_n = \ln(6n^4) - 4\ln n$ _____

Problem 3: Mark the following statements True or False.

  (i) The series $\displaystyle\sum_{n=1}^{\infty} \dfrac{3n + 6}{2n^2}$ converges. _____

  (ii) The series $\cos 1 + \cos(1/2) + \cos(1/4) + \cos(1/16) + \cdots$ diverges. _____

  (iii) If a_n is a sequence and $\displaystyle\lim_{n\to\infty} a_n = 0$, then $\sum a_n$ converges. _____

  (iv) The series $5 - 5 + 5 - 5 + 5 - 5 + \cdots$ converges to 0. _____

Bonus: Recall that given the sequence $s_n = \left(1 + \dfrac{1}{n}\right)^n$ that we have $\displaystyle\lim_{n\to\infty} s_n = e$. Find the limit of the sequence $a_n = \left(\dfrac{2n + 4}{2n}\right)^{4n}$.