2. [15 points]

    a. [9 points] For each of the following sequences, defined for $n \geq 1$, state clearly whether the sequence is:

- increasing, decreasing, or neither.
- bounded or unbounded.
- convergent or divergent.

No justification is needed.

(i) $a_n = 2 - \cos(\pi n)$

(ii) $b_n = \displaystyle\int_1^{n^2} \frac{1}{x} \, dx$

(iii) $c_n = 13 - \displaystyle\sum_{k=0}^{n} \frac{1}{(1.1)^k}$

    b. [6 points] Let $\displaystyle\sum_{n=1}^{\infty} d_n$ be a geometric series, with $d_2 = 16$ and $d_5 = 2$. Determine, and clearly state, whether the series converges or diverges. If the series converges, find its sum.