Clicker Questions

Clicker Question 1

Trying to make a sequence converge

Let $\{a_n\}$ be a sequence that we hope converges. Each of these statements might or might not be true:
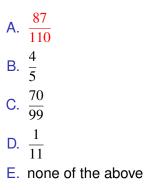
  I. Every term is larger than the previous one:
  $a_1 < a_2 < a_3 < \cdots$.

  II. All of the terms are real numbers between 1 and 8.

Which statement(s), if true, would always force $\{a_n\}$ to converge?

A. either one of I or II is enough to make $\{a_n\}$ converge

B. I makes $\{a_n\}$ converge, regardless of whether II is true

C. II makes $\{a_n\}$ converge, regardless of whether I is true

D. nether I nor II makes $\{a_n\}$ converge by itself, but together I and II make $\{a_n\}$ converge

E. even I and II together don't make $\{a_n\}$ converge

Clicker Question 2

Almost a geometric series

Calculate $\dfrac{7}{10} + \dfrac{9}{100} + \dfrac{9}{10,000} + \dfrac{9}{1,000,000} + \dfrac{9}{100,000,000} + \cdots$.

A. $\dfrac{87}{110}$

B. $\dfrac{4}{5}$

C. $\dfrac{70}{99}$

D. $\dfrac{1}{11}$

E. none of the above

From our formula

$$\frac{7}{10} + \sum_{i=1}^{\infty} \frac{9}{100} \left(\frac{1}{100}\right)^{r-1}$$

$$= \frac{7}{10} + \frac{9/100}{1 - 1/100}$$

$$= \frac{7}{10} + \frac{9}{100 - 1}$$

$$= \frac{7}{10} + \frac{1}{11}.$$