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MATH 1432 - QUIZ 8

August 4, 2014

Show your work to get proper credit.

(1)[3 Pts] Calculate the limit of the following sequences:

(a)

$$a_n = \frac{3^n}{4^n} = \left(\frac{3}{4}\right)^n \to 0 \text{ as } n\to\infty$$ (This is an exponential function, not a polynomial)

(b)

$$a_n = \frac{5n-3}{1-n^2} := \frac{P(n)}{Q(n)}, \quad \deg(P) = 1 < 2 = \deg(Q) \Rightarrow a_n \to 0 \text{ as } n\to\infty$$

(c)

$$a_n = \frac{254n^2+4n^3-17}{n^3+435n^2+12} = \frac{P(n)}{Q(n)}, \quad \deg(P) = 3 = \deg(Q)$$

$$\Rightarrow a_n \xrightarrow{\text{leading coefficient}} \frac{4}{1} = 4 \text{ as } n\to\infty$$

(2)[4 Pts] Give the LUB and GLB for the following sequence

$$a_n = \frac{7n+(-1)^n}{n} \qquad n = 1,2,3,\ldots$$

$$= \frac{7n}{n} + \frac{(-1)^n}{n}$$

$$= 7 + \frac{(-1)^n}{n}$$

$a_1 = 6$

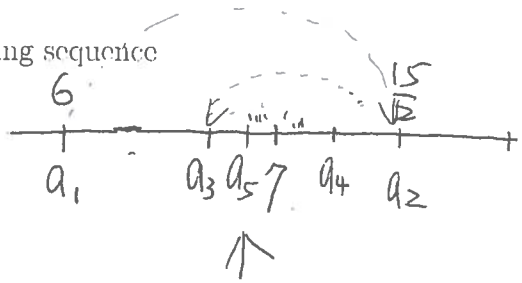
$a_2 = 7 + \frac{1}{2} = \frac{15}{2}$

$a_3 = 7 - \frac{1}{3}$

$a_4 = 7 + \frac{1}{4}$

$a_5 = 7 - \frac{1}{5}$

$a_6 = 7 + \frac{1}{6}$



see this number line.

we have

LUB $= \frac{15}{2}$

GLB $= 6$.

(3)[3 Pts] Write the first three terms of the following sequence:

$$a_1 = 2, \qquad a_{n+1} = (2a_n+3)^2, \qquad \text{for } n = 1,2,3,\ldots$$

$a_1 = 2$.

$a_2 = a_{1+1} = (2a_1+3)^2 = (2\times 2+3)^2 = 7^2 = 49$.

$a_3 = a_{2+1} = (2a_2+3)^2 = (2\times 49+3)^2 = (101)^2 = 10201$

$a_1 = 2$

$a_2 = 49$

$a_3 = 10201$