

Last Name: SOLUTIONS

First Name: _____

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Quiz 1

Question 1. Find the limits of the following sequences:

(a) (5 marks) $\lim_{n \rightarrow \infty} \frac{\ln n}{\ln 2n} = \text{l.f. } \frac{\infty}{\infty}$

$$\stackrel{\textcircled{H}}{=} \lim_{n \rightarrow \infty} \frac{\frac{1}{n}}{\frac{1}{2n} \cdot 2} = \lim_{n \rightarrow \infty} \frac{1}{1} = 1$$

(b) (5 marks) $\lim_{n \rightarrow \infty} 2^{-n} \cos n\pi$

NOTICE $-1 \leq \cos n\pi \leq 1$ FOR $n \geq 1$

$$\Rightarrow -2^{-n} \leq 2^{-n} \cos n\pi \leq 2^{-n} \quad \text{SINCE } 2^{-n} > 0$$

NOW $\lim_{n \rightarrow \infty} (-2^{-n}) = 0$ AND $\lim_{n \rightarrow \infty} (2^{-n}) = 0$

SO $\lim_{n \rightarrow \infty} 2^{-n} \cos n\pi = 0$ BY SQUEEZE THM.