Lecture Questions I: 110.106 Calculus I (Bio & Soc Sci)

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Question 1

Determine the truth of the following two statements:

1. A function can have domain all of $\mathbb{R}$, have limits on all of $\mathbb{R}$, and yet not be continuous.

2. All continuous functions have limits on their domains.

A. Both are true.

B. (1) is true and (2) is false.

C. (1) is false and (2) is true.

D. Both are false.

Question 2

Which of the recursively defined sequences $\{a_n\}$ below is the only one that converges for $a_0 = -1$:

A. $a_{n+1} = \dfrac{9}{5}a_n - \dfrac{7}{5}$.

B. $a_{n+1} = \dfrac{4}{a_n}$.

C. $a_{n+1} = \dfrac{3}{a_n - 2}$.

D. $a_{n+1} = \dfrac{1}{2}\left(a_n - \dfrac{4}{a_n}\right)$.

E. $a_{n+1} = a_n - 1$.

Question 3

Let $f(x) = \sin x$, and $g(x) = \frac{1}{x}$. Determine the truth of the following two statements.

1. $\lim\limits_{x \to 0^+} (f \circ g)(x)$ exists.
2. $\lim\limits_{x \to 0^+} (g \circ f)(x)$ exists.

A. Both are true.

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C. (1) is false and (2) is true.

D. Both are false.

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What changes if $g(x) = \frac{1}{2x+1}$?