Unit 2 Limits Test Review
Multiple Choice Practice

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1. $\lim_{x\to 0} \frac{4x-3}{7x+1} =$

A. ∞ B. $-\infty$ C. 0 D. $\frac{4}{7}$ E. -3

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2. $\lim_{x\to \frac{1}{3}} \frac{9x^2-1}{3x-1} =$

A. ∞ B. $-\infty$ C. 0 D. 2 E. 3

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3. $\lim_{x\to 2} \frac{x^3-8}{x^2-4} =$

A. 4 B. 0 C. 1 D. 3 E. 2

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4. The function $G(x) = \begin{cases} x-3, & x<2 \\ -5, & x=2 \\ 3x-7, & x>2 \end{cases}$ is not continuous at $x = 2$ because…

A. $G(2)$ is not defined B. $\lim_{x\to 2} G(x)$ does not exist C. $\lim_{x\to 2} G(x) \neq G(2)$

D. Only reasons B and C E. All of the above reasons.

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5. $\lim_{x\to \infty} \frac{-3x^2+7x^3+2}{2x^3-3x^2+5} =$

A. ∞ B. $-\infty$ C. 1 D. $\frac{7}{2}$ E. $-\frac{3}{2}$

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6. $\lim_{x\to -2} \frac{\sqrt{2x+5}-1}{x+2} =$

A. 1 B. 0 C. ∞ D. $-\infty$ E. Does Not Exist

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7. If $f(x) = 3x^2 - 5x$, then find $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$.

A. $3x - 5$
B. $6x - 5$
C. $6x$
D. 0
E. Does not exist

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8. $\lim_{x \to -\infty} \frac{2 - 5x}{\sqrt{x^2 + 2}} =$

A. 5　　B. –5　　C. 0　　D. $-\infty$　　E. ∞

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9. The function $f(x) = \frac{2x^2 + x - 3}{x^2 + 4x - 5}$ has a vertical asymptote at $x = -5$ because…

A. $\lim_{x \to -5^+} f(x) = \infty$

B. $\lim_{x \to -5^-} f(x) = -\infty$

C. $\lim_{x \to -5^-} f(x) = \infty$

D. $\lim_{x \to \infty} f(x) = -5$

E. $f(x)$ does not have a vertical asymptote at $x = -5$

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10. Consider the function $H(x) = \begin{cases} 3x - 5, & x < 3 \\ x^2 - 2x, & x \geq 3 \end{cases}$. Which of the following statements is/are true?

I. $\lim_{x \to 3^-} H(x) = 4$.

II. $\lim_{x \to 3} H(x)$ exists.

III. $H(x)$ is continuous at $x = 3$.

A. I only　　B. II only　　C. I and II only

D. I, II and III　　E. None of these statements is true

Free Response Practice #1

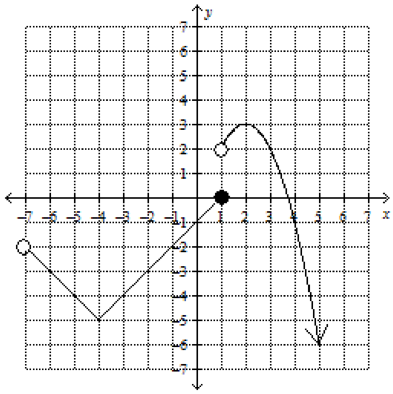
Consider the function $h(x) = \dfrac{-2x - \sin x}{x-1}$ to answer the following questions.

a. Find $\lim_{x \to 1^+} h(x)$. Show your numerical analysis that leads to your answer and explain what this result implies graphically about $h(x)$ at $x = 1$.

b. Find $\lim_{x \to \frac{\pi}{2}} \left[h(x) \cdot (2x - 2) \right]$. Show your analysis.

c. Explain why the Intermediate Value Theorem guarantees a value of c on the interval [1.5, 2.5] such that $h(c) = -4$. Then, find c.

Free Response Practice #2



Graph of $g(x)$

$$f(x) = \begin{cases} ax + 3, & x < -3 \\ x^2 - 3x, & -3 \le x < 2 \\ bx - 5, & x \ge 2 \end{cases}$$

Equation of $f(x)$

Pictured above is the graph of a function $g(x)$ and the equation of a piece-wise defined function $f(x)$. Answer the following questions.

a. Find $\lim_{x \to 1^+} \left[2g(x) - f(x) \cdot \cos \pi x\right]$. Show your work applying the properties of limits.

b. On its domain, what is one value of x at which $g(x)$ is discontinuous? Use the three part definition of continuity to explain why $g(x)$ is discontinuous at this value.

c. For what value(s) of a and b, if they exist, would the function $f(x)$ be continuous everywhere? Justify your answer using limits.