Multiple Choice Practice

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

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

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

$=\lim_{x\to 1/3}(3x+1)=3\left(\frac{1}{3}\right)+1$

$=1+1=2$

A. ∞ B. $-\infty$ C. 0 D. 2 E. 3

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

$=\frac{2^2+2(2)+4}{2+2}=\frac{12}{4}=3$

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

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…

$\lim_{x\to 2^-}G(x)=\lim_{x\to 2^-}G(x)=-1$

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.~~

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

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

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

$=\frac{2}{\sqrt{2(-2)+5}+1}=\frac{2}{\sqrt{1}+1}=\frac{2}{2}=1$

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

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

$\lim_{h\to 0} \frac{3(x+h)^2 - 5(x+h) - (3x^2-5x)}{h}$

$= \lim_{h\to 0} \frac{3x^2 + 6hx + 3h^2 - 5x - 5h - 3x^2 + 5x}{h}$

$= \lim_{h\to 0} \frac{h(6x+3h-5)}{h}$

$= 6x + 3(0) - 5$

$= 6x - 5$

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

$\sqrt{x^2} = -x \ (x<0)$

$= \lim_{x\to-\infty} \frac{\frac{2}{-x} - \frac{5x}{-x}}{\sqrt{\frac{x^2}{x^2} + \frac{2}{x^2}}} = \lim_{x\to-\infty} \frac{\frac{2}{-x} + 5}{\sqrt{1 + \frac{2}{x^2}}}$

$= \frac{0+5}{\sqrt{1+0}} = \frac{5}{\sqrt{1}} = 5$

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 $x = -5$

$f(x) = \frac{(2x+3)(x-1)}{(x+5)(x-1)}$

x	$\frac{2x+3}{x+5}$
-5.1	$\frac{-}{-} = +$
-4.9	$\frac{-}{+} = -$

$x \to -5^-, f \to \infty$

$x \to -5^+, f \to -\infty$

$2x^2 + x - 3$

$2x^2 + 3x - 2x - 3$

$x(2x+3) - 1(2x+3)$

$(x-1)(2x+3)$

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

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

$\lim_{x\to 3^+} (x^2 - 2x)$

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

A. I only
B. II only
C. I and II only
D. I, II and III
E. None of these statements is true