Get out your review, we will go over it quickly!

Unit 1 Test Corrections due today.

*Quiz retakes available Monday, October 3 - Friday, October 7.

AP CALCULUS AB
Unit 2 Review
Limits and Continuity

NO CALCULATOR IS ALLOWED ON THIS REVIEW.

1. What is $\lim_{x\to\infty} \frac{\sqrt{9x^2+2}}{4x+3}$? $\frac{\sqrt{900^2+2}}{400+3} = \frac{3}{4}$

(A) $\frac{3}{2}$ (B) $\frac{3}{4}$ (C) $\frac{\sqrt{2}}{3}$ (D) 1 (E) The limit does not exist.

ebm: $\frac{3x}{4x} = \frac{3}{4}$

2. What is $\lim_{x\to 1} \frac{\sqrt{x}-1}{x-1}$? $\left(\frac{\sqrt{x}+1}{\sqrt{x}+1}\right) = \lim_{x\to 1} \left(\frac{\cancel{(x-1)}}{\cancel{(x-1)}(\sqrt{x}+1)}\right) = \lim_{x\to 1} \frac{1}{\sqrt{x}+1} = \frac{1}{1+1} = \frac{1}{2}$

(A) 0

(B) $\frac{1}{2}$

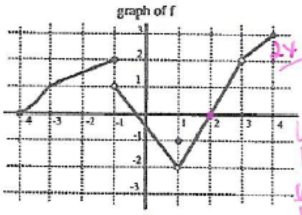
(C) 1

(D) $\frac{3}{2}$

(E) The limit does not exist.

Sep 19-9:00 AM

3. The function f is defined on the interval $[-5, 5]$ and its graph is shown to the right. Which of the following statements are true?



$m = \frac{2}{1}$ $2x - 4$

I. $\lim_{x\to 1} f(x) = \cancel{-1}$ $= -2$

II. $\lim_{h\to 0} \frac{f(2+h)-f(2)}{h} = 2$ $x = 2$ $(2, 0)$

III. $\lim_{x\to -1^+} f(x) = f(-3)$
$= 1$ $= 1$

$f(-3) = 1$

$\lim_{h\to 0} \frac{f(2+h)-f(2)}{h} =$

$\lim_{h\to 0} \frac{2(2+h)-4-0}{h} =$

$\lim_{h\to 0} \frac{4+2h-4}{h} = \frac{2h}{h} = 2$

(A) I only (B) II only (C) I and II only (D) II and III only (E) I, II, III

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conjugate

4. The function f is continuous at $x = 1$.

If $f(x) = \begin{cases} \dfrac{\sqrt{x+3}-\sqrt{3x+1}}{x-1} & \text{for } x \neq 1 \\ k & \text{for } x = 1 \end{cases}$ then $k =$

(A) 0 (B) 1 (C) $\frac{1}{2}$ (D) $-\frac{1}{2}$ (E) none of the above

$$\left(\frac{\sqrt{x+3}-\sqrt{3x+1}}{x-1}\right)\left(\frac{\sqrt{x+3}+\sqrt{3x+1}}{\sqrt{x+3}+\sqrt{3x+1}}\right) = \frac{(x+3)-(3x+1)}{(x-1)(\sqrt{x+3}+\sqrt{3x+1})} = \frac{-2x+2}{(x-1)(\sqrt{x+3}+\sqrt{3x+1})} = \frac{-2\cancel{(x-1)}}{\cancel{(x-1)}(\sqrt{x+3}+\sqrt{3x+1})} = \frac{-2}{\sqrt{x+3}+\sqrt{3x+1}} = \frac{-2}{\sqrt{1+3}+\sqrt{3+1}} = \frac{-2}{4}$$

5. Which of the following is true about the function f if $f(x) = \dfrac{(x-1)^2}{2x^2-5x+3}$? $= \dfrac{(x-1)^2}{(2x-3)(x-1)}$

x^2-2x+1

F I. f is continuous at $x = 1$. ∞ disc.

T II. The graph of f has a vertical asymptote at $x = 1$. yes

T III. The graph of f has a horizontal asymptote at $y = \frac{1}{2}$. yes

(A) I only (B) II only (C) III only (D) II and III only (E) I, II, III

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

(D) $y = \dfrac{x}{x^2+1}$

(E) $y = \dfrac{4x}{(x+1)^2}$

∞ disc @ $x=-1$

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7. $\lim\limits_{x\to 1} \dfrac{x^2+2x-3}{x^2-1} = \lim\limits_{x\to 1} \dfrac{(x+3)\cancel{(x-1)}}{(x+1)\cancel{(x-1)}} = \lim\limits_{x\to 1} \dfrac{x+3}{x+1} = f(1) = \dfrac{1+3}{1+1} = \dfrac{4}{2} = \boxed{2}$

(A) −2

(B) −1

(C) 10

(D) 1

(E) 2

8. $\lim\limits_{x\to 2} \dfrac{\frac{1}{x-4}+\frac{1}{x}}{2-x}\left(\frac{x-4}{x-4}\right) = \lim\limits_{x\to 2} \dfrac{x+x-4}{x(x-4)(2-x)} = \lim\limits_{x\to 2} \dfrac{2\cancel{(x-2)}}{-x(x-4)\cancel{(x-2)}} = \lim\limits_{x\to 2} \dfrac{2}{-x(x-4)} = f(2) = \dfrac{2}{-2(2-4)} = \dfrac{2}{-2\cdot -2} = \dfrac{2}{4} = \boxed{\frac{1}{2}}$

9. $\lim\limits_{x\to 0} \dfrac{\sin x\cos x - \sin x}{x^2} = \lim\limits_{x\to 0} \dfrac{\sin x(\cos x - 1)}{x^2} = \lim\limits_{x\to 0} \dfrac{\sin x}{x} \cdot \lim\limits_{x\to 0} \dfrac{\cos x - 1}{x} = 1 \cdot \lim\limits_{x\to 0} \cos x - 1 \cdot \lim\limits_{x\to 0} \dfrac{1}{x} = 1 \cdot 0 \cdot \infty = \boxed{0}$

(A) 2 (B) $\frac{40}{3}$ (C) ∞ (D) 0 (E) undefi

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10. $\lim_{n\to\infty} \frac{3n^3 - 5n}{n^3 - 2n^2 + 1}$ is $\Rightarrow \lim_{n\to\infty} \frac{3\infty^3 - 5\infty}{\infty^3 - 2\infty^2 + 1}$

(A) -5 (B) -2 (C) 1 (D) 3 (E) nonexistent

e.b.m: $\frac{3n^3}{n^3} = 3$

11. $\lim_{\theta\to 0} \frac{1 - \cos\theta}{2\sin^2\theta}$ is $\Rightarrow \frac{1}{2}\lim_{\theta\to 0} \frac{1-\cos\theta}{\sin^2\theta} = \frac{1}{2}\lim_{\theta\to 0} \frac{1-\cos\theta}{1-\cos^2\theta} = \frac{1}{2}\lim_{\theta\to 0} \frac{(1-\cos\theta)}{(1-\cos\theta)(1+\cos\theta)}$

$f(0) = \frac{1}{2}\cdot\frac{1}{1+\cos 0} = \frac{1}{2}\cdot\frac{1}{2} = \boxed{\frac{1}{4}}$

(A) 0 (B) $\frac{1}{8}$ (C) $\frac{1}{4}$ (D) 1 (E) nonexistent

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