

Questions on 2.4 homework? Do you want to look at those last few problems from the 2.2b worksheet?

Note: Unit 1 Test Corrections due Tuesday, October 4.

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

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{(x+h) - x} \quad y = (-2)^2 = 4$$

2.4 HW

(a) $y = x^2$ at $x = -2$ $(-2, 4)$

$$a) \lim_{h \rightarrow 0} \frac{f(-2+h) - f(-2)}{(-2+h) - (-2)} = \lim_{h \rightarrow 0} \frac{(-2+h)^2 - (-2)^2}{h}$$

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

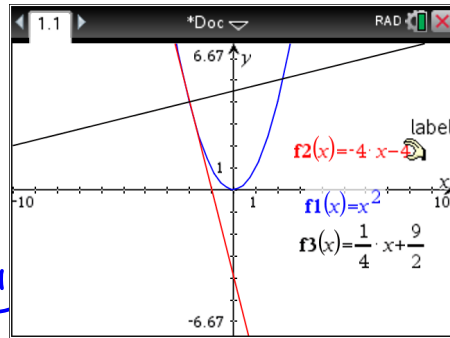
$$\lim_{h \rightarrow 0} \frac{h(-4+h)}{h} = \lim_{h \rightarrow 0} (-4+h) = f(0) = -4+0 = -4$$

(b) $m = -4$ at $(-2, 4)$

$$y - 4 = -4(x + 2)$$

$$y = -4x - 8 + 4$$

$$y = -4x - 4$$



(c) $(-2, 4)$ & $m = \frac{1}{4}$

$$y - 4 = \frac{1}{4}(x + 2)$$

$$y = \frac{1}{4}x + \frac{1}{2} + 4$$

$$y = \frac{1}{4}x + \frac{9}{2}$$

(18) $f(x) = \begin{cases} \sin x, & 0 \leq x < \frac{3\pi}{4} \\ \cos x, & \frac{3\pi}{4} \leq x < 2\pi \end{cases}$ at $x = \frac{3\pi}{4}$

$\lim_{x \rightarrow \frac{3\pi}{4}^-} f(x) = \sin\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}$ *left hand limit*

$\lim_{x \rightarrow \frac{3\pi}{4}^+} f(x) = \cos\left(\frac{3\pi}{4}\right) = -\frac{\sqrt{2}}{2}$ *right hand limit*

No tangent line at $x = \frac{3\pi}{4}$,
the two-sided limit does not exist.

(12)

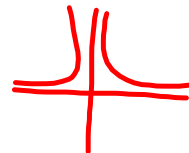
$$\lim_{h \rightarrow 0} \left[\frac{(h^2 - 3h - 1) - (-1)}{h} \right]$$

2.2b WKS

$$\textcircled{5} \lim_{x \rightarrow 0} \frac{\sin(5x)}{3x} \cdot \frac{\frac{5}{3}}{\frac{5}{3}} = \lim_{x \rightarrow 0} \frac{5}{3} \frac{\sin(5x)}{5x} = \frac{5}{3} \cdot 1 = \frac{5}{3}$$

$$\textcircled{6} \lim_{x \rightarrow 0} \frac{x(x^2-7)}{x^2} = \lim_{x \rightarrow 0} \frac{x^2-7}{x^2} = \lim_{x \rightarrow 0} \frac{1}{x^2} (x^2-7)$$

$$\lim_{x \rightarrow 0} \frac{1}{x^2} \cdot \lim_{x \rightarrow 0} (x^2-7) = -7 \lim_{x \rightarrow 0} \frac{1}{x^2} = -\infty$$



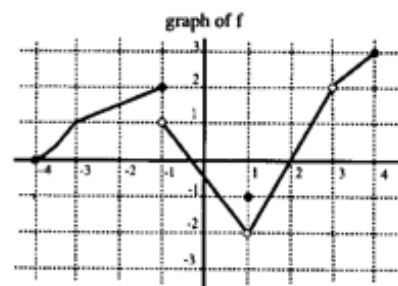
AP CALCULUS AB
Unit 2 Review
Limits and Continuity

NO CALCULATOR IS ALLOWED ON THIS REVIEW.

1. What is $\lim_{x \rightarrow \infty} \frac{\sqrt{9x^2 + 2}}{4x + 3}$?
- (A) $\frac{3}{2}$ (B) $\frac{3}{4}$ (C) $\frac{\sqrt{2}}{3}$ (D) 1 (E) The limit does not exist.

2. What is $\lim_{x \rightarrow 1} \frac{\sqrt{x} - 1}{x - 1}$?
- (A) 0
 (B) $\frac{1}{2}$
 (C) 1
 (D) $\frac{3}{2}$
 (E) The limit does not exist.

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?



- I. $\lim_{x \rightarrow 1} f(x) = -1$
- II. $\lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h} = 2$
- III. $\lim_{x \rightarrow -1^+} f(x) = f(-3)$
- (A) I only (B) II only (C) I and II only (D) II and III only (E) I, II, III

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

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

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

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

- I. f is continuous at $x = 1$.
 II. The graph of f has a vertical asymptote at $x = 1$.
 III. The graph of f has a horizontal asymptote at $y = \frac{1}{2}$.
- (A) I only (B) II only (C) III only (D) II and III only (E) I, II, III

6. Which function is NOT continuous everywhere?

- (A) $y = |x|$
 (B) $y = x^{2/3}$
 (C) $y = \sqrt{x^2 + 1}$
 (D) $y = \frac{x}{x^2 + 1}$
 (E) $y = \frac{4x}{(x+1)^2}$

7. $\lim_{x \rightarrow 1} \frac{x^2 + 2x - 3}{x^2 - 1} =$

(A) -2

(B) -1

(C) 10

(D) 1

(E) 2

8. $\lim_{x \rightarrow 2} \frac{\frac{1}{x-4} + \frac{1}{x}}{2-x} =$

9. $\lim_{x \rightarrow 0} 4 \frac{\sin x \cos x - \sin x}{x^2} =$

(A) 2

(B) $\frac{40}{3}$

(C) ∞

(D) 0

(E) undefi

10.

$$\lim_{n \rightarrow \infty} \frac{3n^3 - 5n}{n^3 - 2n^2 + 1} \text{ is}$$

(A) -5

(B) -2

(C) 1

(D) 3

(E) nonexistent

11.

$$\lim_{\theta \rightarrow 0} \frac{1 - \cos \theta}{2 \sin^2 \theta} \text{ is}$$

(A) 0

(B) $\frac{1}{8}$ (C) $\frac{1}{4}$

(D) 1 - -

(E) nonexistent

Homework

Unit 2 Review