Name: _____

AP Calculus – Limits Homework (No Calculator)

On problems 1-8, find

(a) $\lim_{x\to\infty} f(x)$

(b) $\lim_{x\to-\infty} f(x)$

1. $f(x) = \frac{3x^3-4x^2-1}{x^2+x-13}$

(a) ∞ (b) $-\infty$

2. $f(x) = \frac{4x^2-3x+5}{2x^3+x-1}$

(a) 0 (b) 0

3. $f(x) = \frac{3x+1}{x-4}$

(a) 3 (b) 3

4. $f(x) = \frac{-2x^2+4}{\sqrt{4x^4+8x^2+1}}$

(a) -1 (b) -1

5. $f(x) = \frac{5x^3+1}{\sqrt{3x^6+x^2+4}}$

(a) $\frac{5}{\sqrt{3}}$ (b) $\frac{-5}{\sqrt{3}}$

6. $f(x) = -3x^3 + 6x^2 - 4$

(a) $-\infty$ (b) ∞

7. $f(x) = x^4 - 5$

(a) ∞ (b) ∞

8. $f(x) = -4x + 6$

(a) $-\infty$ (b) ∞

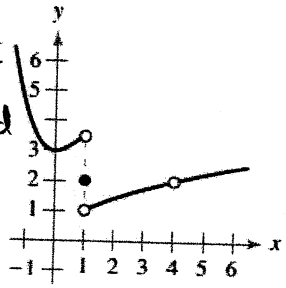
In problems 9 and 10, use the function f to decide whether the value of the given quantity exists. If it does, find it. If not, explain why.

9. (a) $f(1) = 2$

(b) $\lim_{x\to1} f(x)$ = DNE

(c) $f(4)$ = undefined

(d) $\lim_{x\to4} f(x) = 2$



10. (a) $f(-2)$ = undefined

(b) $\lim_{x\to-2} f(x)$ = DNE

(c) $f(0) = 4$

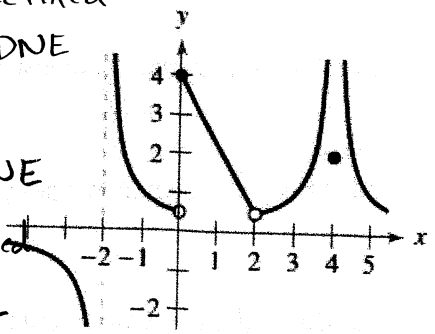
(d) $\lim_{x\to0} f(x)$ = DNE

(e) $f(2)$ = undefined

(f) $\lim_{x\to2} f(x) = 1/2$

(g) $f(4) = 2$

(h) $\lim_{x\to4} f(x) = \infty$



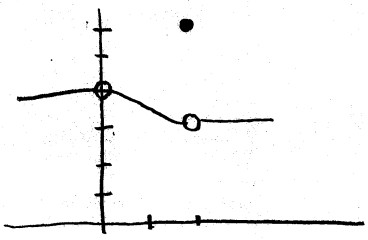
11. Sketch a graph of f that satisfies the given conditions (there could be more than one correct graph).

$f(0)$ is undefined.

$\lim_{x\to0} f(x) = 4$

$f(2) = 6$

$\lim_{x\to2} f(x) = 3$



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In Exercises 12 – 13, complete the table and use the results to estimate the limit. Use a calculator for this section.

12. $\lim_{x \to 0} \frac{\sqrt{x+1}-1}{x}$ = 0.5

	−0.1	−0.01	−0.001	0	0.001	0.01	0.1
	0.513	0.501	0.500	?	0.499	0.498	0.488

13. $\lim_{x \to 4} \frac{x-4}{x^2-3x-4}$ = 0.2

	3.9	3.99	3.999	4	4.001	4.01	4.1
	0.204	0.200	0.200	?	0.199	0.199	0.196

Summer Assignment Review Problems:

14. Solve the inequality using a sign chart: $(x+1)(x-3)^2 > 0$. $(1,3) \cup (3,\infty)$

15. Solve the inequality using a sign chart: $\frac{x-1}{x^2-4} < 0$. $(-\infty,-2) \cup (1,2)$

16. Find any vertical and horizontal asymptotes and use limits to describe the end behavior: $f(x) = \frac{x^2+2x-3}{x+2}$.

VA: $x = -2$ HA: N/A

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