Name_____ Date_____ Period_____

Worksheet 2.2—Limits & Continuity

Show all work on a separate sheet of paper. Give simplified, exact values for all answers. **No Calculator is Permitted.**

I. Multiple Choice

1. Suppose $\lim_{x\to 5} f(x) = 4$. Which of these statements must be true?

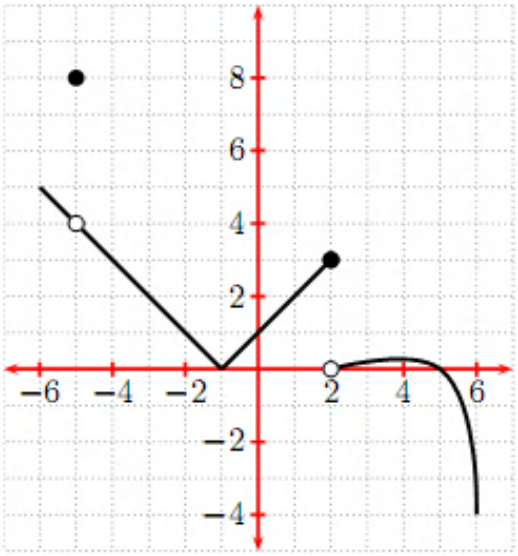
   I. The range of f need not contain 4

   II. f is defined on some x-interval (a,b) for some $a < 5 < b$

   III. As x approaches 5 from the left, $f(x)$ approaches 4.

   (A) II only (B) III only (C) I and III only (D) I, II, and III only (E) None of them

Use the graph of $f(x)$ at right to answer questions 2 through 6.



2. Determine $\lim_{x\to 2^-} f(x)$.

   (A) 0 (B) 3 (C) -4 (D) $\frac{3}{2}$ (E) DNE

3. Determine $\lim_{x\to 2^+} f(x)$.

   (A) 0 (B) 3 (C) -4 (D) $\frac{3}{2}$ (E) DNE

4. Determine $\lim_{x\to 2} f(x)$.

   (A) 0 (B) 3 (C) -4 (D) $\frac{3}{2}$ (E) DNE

5. Determine $\lim_{x\to -5} f(x)$.

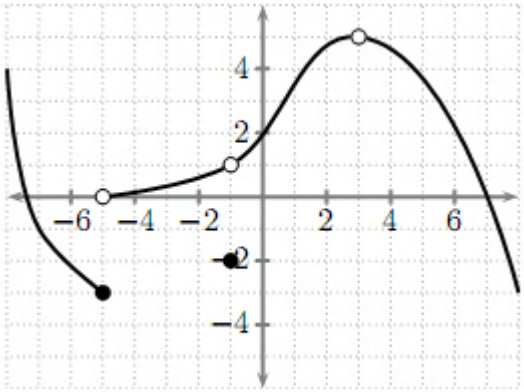
   (A) 4 (B) 8 (C) 0 (D) 6 (E) DNE

6. Determine $f(-5)$.

   (A) 4 (B) 8 (C) 0 (D) 6 (E) DNE

7. The graph of a function $f(x)$ is shown at right. Use the graph to determine all the values of x at which f fails to be continuous on the open interval $(-8,8)$.

   (A) $-5, 3$ (B) $-1, 3$ (C) $-5, -1$
   (D) $-5, -1, 3$ (E) f is continuous everywhere



8. Evaluate $\lim_{x\to\infty} \dfrac{-4x^2+3x^5+1}{-7x^5+x^2+2}$

(A) 0 (B) $-\dfrac{3}{7}$ (C) $\dfrac{4}{7}$ (D) ∞ (E) $-\infty$

9. Evaluate $\lim_{x\to-\infty} \dfrac{-5x^7-8x^5+2}{-3x^6-x^3+x^2}$

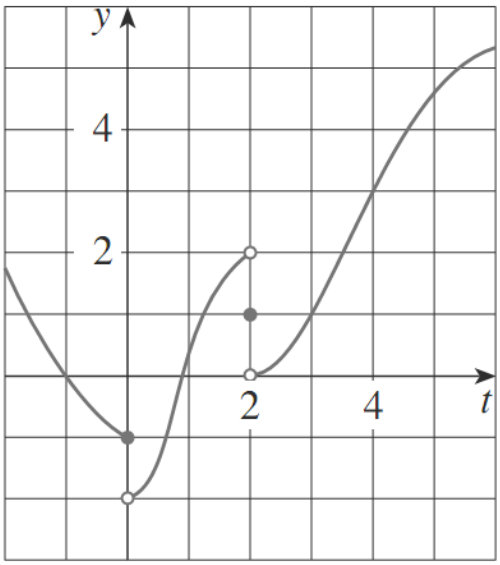
(A) 0 (B) $\dfrac{5}{3}$ (C) $-\dfrac{5}{3}$ (D) ∞ (E) $-\infty$

10. Evaluate $\lim_{x\to-5^+} \dfrac{-2}{x+5}$

(A) 0 (B) -2 (C) $-\dfrac{1}{5}$ (D) ∞ (E) $-\infty$

II. Short Answer

11. Given the graph at right, answer/find the following:



(a) $f(0)$ (b) $\lim_{x\to0^-} f(x)$ (c) $\lim_{x\to0^+} f(x)$

(d) $\lim_{x\to0} f(x)$ (e) continuous at $x=0$?

(f) $f(2)$ (g) $\lim_{x\to2^-} f(x)$ (h) $\lim_{x\to2^+} f(x)$

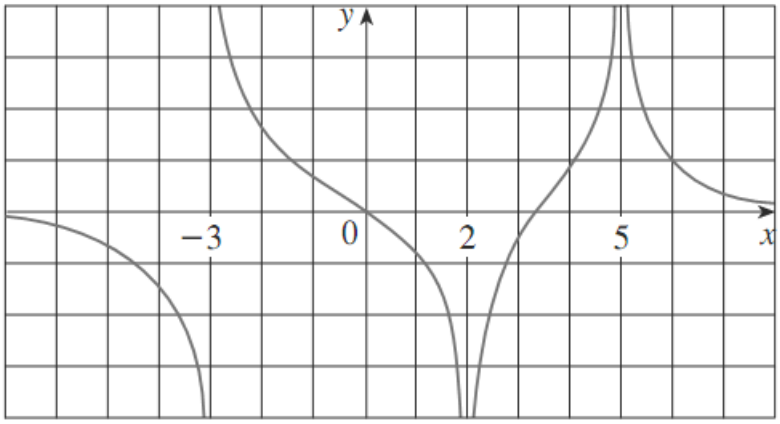
(i) $\lim_{x\to2} f(x)$ (j) continuous at $x=2$?

(k) $f(4)$ (l) $\lim_{x\to4^-} f(x)$ (m) $\lim_{x\to4^+} f(x)$

(n) $\lim_{x\to4} f(x)$ (o) continuous at $x=4$?

12. For the function R whose graph is shown below, state the following:

(a) $\lim_{x\to2} R(x)$ (b) $\lim_{x\to5} R(x)$ (c) $\lim_{x\to-3^-} R(x)$ (d) $\lim_{x\to-3^+} R(x)$ (e) $\lim_{x\to-3} R(x)$



13. For each function, $f(x)$, determine i) $\lim_{x\to-\infty} f(x)$ ii) $\lim_{x\to\infty} f(x)$ iii) any equations of HA's

(a) $f(x)=\dfrac{-5x+1}{x+7x^2+4}$ (b) $f(x)=\dfrac{3x^6-2x^3+\pi}{8-9x^4}$ (c) $f(x)=6x^2-100x-5000$

(d) $f(x)=3-2x^3$ (e) $f(x)=\dfrac{12x+17-53x^2}{x^2+22x-114}$ (f) $f(x)=-4\sqrt{x+7}$

14. Draw the graph of a function $f(x)$ on the interval $-\infty < x \le 7$ with the following characteristics.

$\lim_{x\to-10^-} f(x)=-2=\lim_{x\to-10^+} f(x)$, $f(-10)=2$, $\lim_{x\to0^-} f(x)=-\infty$, $\lim_{x\to0^+} f(x)=\infty$

$\lim_{x\to5^-} f(x)=0=f(5)$, $\lim_{x\to5^+} f(x)=4$, $f(7)=4$, $\lim_{x\to-\infty} f(x)=0$