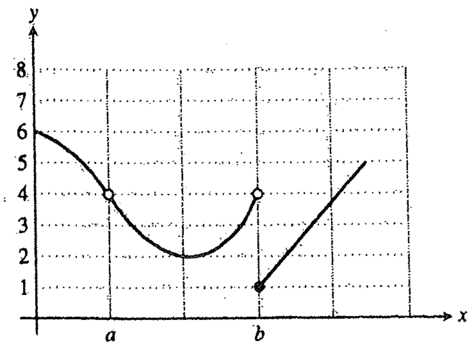
Name Key Hr

Review Problems Before Opportunity #1

1. The graph of the function f is shown. Which of the following statements about f is true?



(A) $\lim_{x \to a} f(x) = \lim_{x \to b} f(x)$ F
(B) $\lim_{x \to a} f(x) = 4$ T
(C) $\lim_{x \to b} f(x) = 4$ F
(D) $\lim_{x \to b} f(x) = 1$ F
(E) $\lim_{x \to a} f(x)$ does not exist. F

2. Evaluate $\lim_{x \to 1} \frac{\ln x}{3x}$

(A) 0
(B) $\frac{3}{e}$
(C) e
(D) 3
(E) The limit does not exist.

$\frac{\ln 1}{3(1)} = \frac{0}{3} = 0$

3. If the graph of $y = \frac{ax + b}{x + c}$ has a horizontal asymptote $y = -2$, a vertical asymptote $x = 4$, and an x-intercept of 1.5, then $a - b + c =$

$\frac{-2x+3}{x+-4}$

$-2x+b=0$
$-2(1.5)+b=0$
$-3+b=0$
$b=3$

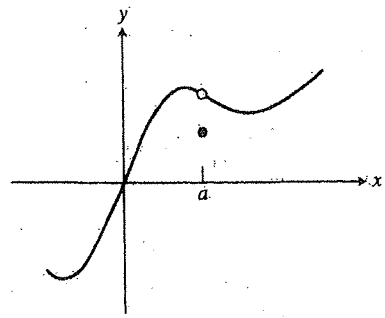
$-2-3+-4=\boxed{-9}$

4. Use the values in the table to approximate $\lim_{x \to -1.8} f(x)$.

x	$f(x)$
−1.83	−22.51
−1.82	−22.54
−1.81	−22.57
−1.8	
−1.79	−22.63
−1.78	−22.66
−1.77	−22.69

$\frac{-22.57 + -22.63}{2} = \boxed{-22.6}$

5. The graph of a function f is shown. Which of the following statements about f is false?



(A) $\lim_{x \to a} f(x)$ exists. T

(B) $\lim_{x \to a^-} f(x) = \lim_{x \to a^+} f(x)$ T

(C) $f(a)$ exists. T

(D) f is continuous at $x = a$. F

6. If $a \neq 0$, then $\lim_{x \to a} \dfrac{x^3 - a^3}{a^6 - x^6}$ is

(A) nonexistent.

(B) 0.

(C) $-\dfrac{1}{2a^3}$.

(D) $-\dfrac{1}{a^3}$.

(E) $\dfrac{1}{2a^3}$.

$$\lim_{x \to a} \frac{\cancel{x^3 - a^3}}{(a^3 + x^3)\underbrace{\cancel{(a^3 - x^3)}}_{-1}} =$$

$$\lim_{x \to a} \frac{1}{a^3 + x^3} = \frac{1}{a^3 + a^3} = \boxed{\frac{1}{-2a^3}}$$

7. $f(x) = \begin{cases} 2x - 3, & x \leq 2 \\ x^2 - 1, & x > 2 \end{cases}$

$2(2) - 3 = 1$ $\quad$ $2^2 - 1 = 3$

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

(B) $\lim_{x \to 2^+} f(x) =$ 3

(C) What does this imply about the $\lim_{x \to 2} f(x)$? Explain. The limit does not exist since $\lim_{x \to 2^-} f(x) \neq \lim_{x \to 2^+} f(x)$.

8. Let $f(x) = \begin{cases} 2x - 3, & x \leq 2 \\ x^2 + a, & x > 2. \end{cases}$

$2x - 3 = 1$ $\quad$ $2x = 4$ $\quad$ $x = 2$

Use one-sided limits to find the value of a so that $\lim_{x \to 2} f(x) = 1$.

$\lim_{x \to 2^-} 2x - 3 = 1$ $\quad$ $\lim_{x \to 2^+} x^2 + a = 1$

$2^2 + a = 1$

$\boxed{a = -3}$