

1. If $f(x) = e^x$, which of the following lines is an asymptote to the graph of f ?

(A) $y = 0$

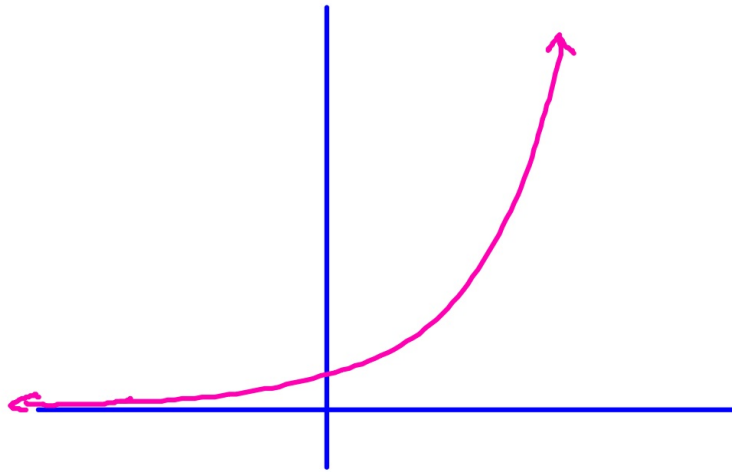
(B) $x = 0$

(C) $y = x$

(D) $y = -x$

(E) $y = 1$

- A ☒ 5
 B ☐ 3
 C ☐ 3
 D ☐ 0
 E ☐ 2



2. If $f(x) = \frac{x-1}{x+1}$ for all $x \neq -1$, then $f'(1) =$

(A) -1

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

(C) 0

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

(E) 1

- A ☐ 3
 B ☐ 0
 C ☐ 6
 D ☒ 3
 E ☐ 1

$$f'(x) = \frac{1(x+1) - 1(x-1)}{(x+1)^2}$$

$$f'(1) = \frac{1(1+1) - 1(1-1)}{(1+1)^2}$$

$$= \frac{1(2) - 1(0)}{2^2} = \frac{2-0}{4} = \frac{2}{4}$$

3. If $f(x) = 2x^3 + Ax^2 + Bx - 5$ and if $f(2) = 3$ and $f(-2) = -37$, what is the value of $A + B$?

(A) -6

(B) -3

(C) -1

(D) 2

(E) It cannot be determined from the information given.

$$-3 + 2 = -1$$

A 0

B 3

C 0

D 1

E 8

$$\begin{aligned} 16 + -3(4) + 2B - 5 &= 3 \\ 16 - 12 + 2B - 5 &= 3 \\ 2B - 1 &= 3 \\ 2B &= 4 \\ \frac{2B}{2} &= \frac{4}{2} \quad B = 2 \end{aligned}$$

$$\begin{aligned} 2(2)^3 + A(2)^2 + B(2) - 5 &= 3 \\ + 2(-2)^3 + A(-2)^2 + B(-2) - 5 &= -37 \end{aligned}$$

$$0 + 8A + 0 - 10 = -34$$

$$8A - 10 = -34$$

$$\frac{8A}{8} = \frac{-24}{8}$$

$$A = -3$$

4. Let $f(x) = \left| \sin x - \frac{1}{2} \right|$. The maximum value attained by f is

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

(B) 1

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

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

(E) $\frac{3\pi}{2}$

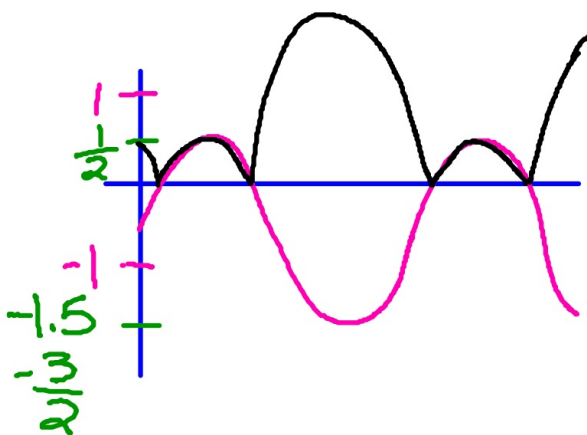
A 2

B 4

C 0

D 6

E 1



5. $\lim_{x \rightarrow -\infty} \frac{4x^2 + x - 7}{x^2 - 5x - 3} =$

(A) 0

(B) $\frac{7}{3}$

(C) 4

(D) 1

(E) Does not exist

A | 0

B | 0

C ☒ 11

D ☐ 1

E ☐ 1

$x \rightarrow -\infty$ (Sweep away the crumbs)

6. What is the instantaneous rate of change at $x = 3$ of the function $f(x) = \frac{x^2 - 2}{x + 1}$?

derivative

(A) $-\frac{17}{16}$

(B) $-\frac{1}{8}$

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

(D) $\frac{13}{16}$

(E) $\frac{17}{16}$

A | 0

B ☐ 1

C ☐ 2

D ☐ 4

E ☒ 6

$$f'(x) = \frac{2x(x+1) - 1(x^2 - 2)}{(x+1)^2}$$

$$f'(3) = \frac{2(3)(3+1) - 1(3^2 - 2)}{(3+1)^2}$$

7. If $f(x) = -x^5 + x + \frac{1}{x^2}$, then $f'(-1) =$

(A) 8

(B) 2

(C) -2

(D) -3

(E) -8

A 2

B 2

C 5

D 2

E 2

$$f(x) = -x^5 + x + x^{-2}$$

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

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

$$\begin{aligned} f'(-1) &= -5(-1)^4 + 1 - \frac{2}{(-1)^3} \\ &= -5(1) + 1 - \frac{2}{-1} = -5 + 1 + 2 = -2 \end{aligned}$$

8.

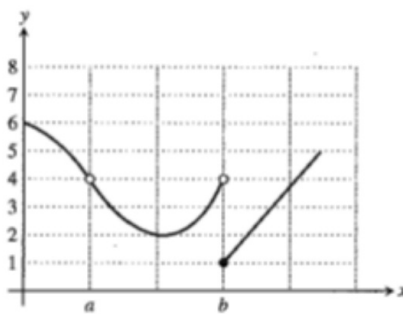
A 1

B 8

C 0

D 2

E 2



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

4 DNE

(A) $\lim_{x \rightarrow a} f(x) = \lim_{x \rightarrow b} f(x)$

(B) $\lim_{x \rightarrow a} f(x) = 4$

(C) $\lim_{x \rightarrow b} f(x) = 4$

(D) $\lim_{x \rightarrow b} f(x) = 1$

(E) $\lim_{x \rightarrow a} f(x)$ does not exist

9. Let $f(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$. For what value of x does $f(x) = 4$?

(A) -2

(B) -1

(C) 1

(D) 2

(E) 4

A ☐ 3

B ☐ 0

C ☐ 2

D ☒ 5

E ☐ 3

$$g(x) = x^2$$

$$g'(x) = f(x)$$

$$2x = 4$$

$$\lim_{h \rightarrow 0} \frac{g(x+h) - g(x)}{h} = g'(x)$$

10. Evaluate $\lim_{x \rightarrow 1} \frac{\ln x}{3x}$

(A) 0

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

(C) e

(D) 3

(E) Does not exist

A ☒ 3

B ☐ 2

C ☐ 2

D ☐ 2

E ☐ 4

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