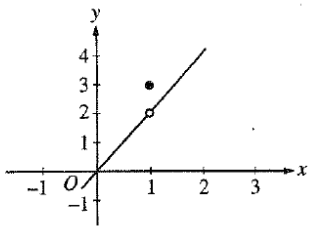
AP Problems Chapter 2

Limits

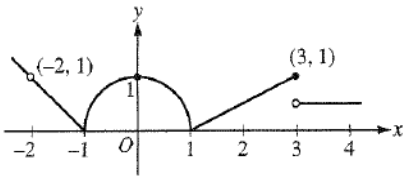
Calculator okay

81. The graph of the function f is shown below. The value of $\lim_{x\to 1} \sin f(x))$ is

A) 0.909 B) 0.841 C) 0.141 D) -0.416 E) nonexistent



Graph of f



Graph of f

78. The graph of a function f is shown above. For which of the following values of c does $\lim_{x\to c} f(x) = 1$?

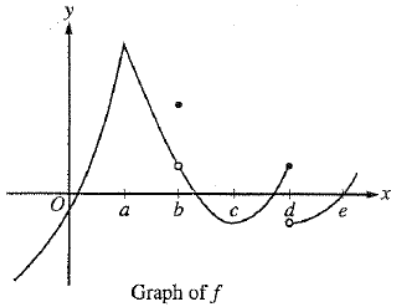
A) 0 only
B) 0 and 3 only
C) -2 and 0 only
D) -2 and 3 only
E) -2, 0, and 3

1. If $f(x) = -x^2 + x$, which of the following expresssions represents $f'(x)$?

$(A)\ \lim_{h\to 0} \dfrac{\left(-x^2+x+h\right)-\left(-x^2+x\right)}{h}$ $(B)\ \lim_{h\to x} \dfrac{\left(-x^2+x+h\right)-\left(-x^2+x\right)}{h}$

$(C)\ \dfrac{[-(x+h)^2+(x+h)]-\left(-x^2+x\right)}{h}$ $(D)\ \lim_{h\to 0} \dfrac{[-(x+h)^2+(x+h)]-\left(-x^2+x\right)}{h}$

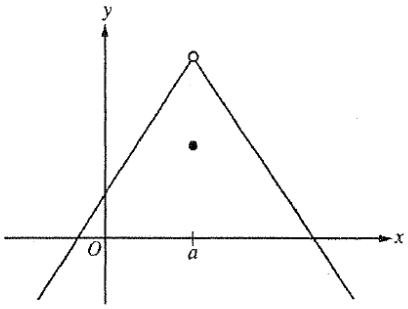
(E) None of the above



Graph of f

13. The graph of a function f is shown above. At which value of x is f continuous, but not differentiable?

A) a B) b C) c D) d E) e



Graph of f

76. The graph of the function f is shown above. Which of the following statements must not be true.

A) f(a) exists
B) f(x) is defined for $0 < x < a$
C) f is not continuous at $x = a$
D) $\lim_{x \to a} f(x)$ exists
E) $\lim_{x \to a} f'(x)$ exists

19. $\lim_{h \to 0} \dfrac{f(4+h) - f(4)}{h} = 6$ is equivalent to

(A) f(4) = 6 (B) f(h) = 2 (C) $f'(4) = 6$

(D) $\lim_{h \to 0} \dfrac{f(h)}{h} = 6$ (E) $\lim_{h \to 0} \dfrac{f(4-h) + f(4)}{h} = 6$

Let f be a function defined by $f(x)=\begin{cases}1-2\sin x & \text{for } x\le 0\\ e^{-4x} & \text{for } x>0\end{cases}$

Show that f is continuous at x = 0.

6. Let f be the function defined below. Which of the following statements about f are true?

$$f(x)=\begin{cases}\dfrac{x^2-4}{x-2} & \text{if } x\neq 2\\ 1 & \text{if } x=2\end{cases}$$

I. f has a limit at x = 2
II. f is continuous x = 2
III. f is differentiable at x = 2

A) I only
B) II only
C) III only
D) I and II only
E) I, II, and III only

1. Grass clippings are place in a bin, where they decompose. For $0\le t\le 30$, the amount of grass clippings remaining in the bin is modeled by A(t) = $6.687(0.931)^t$, where A(t) is measured in pounds and t is measured in days.

a) Find the average rate of change of A(t) over the interval $0\le t\le 30$. Indicate units of measure.

21. The line y = 5 is a horizontal asymptote to the graph of which of the following?

A) $y=\dfrac{\sin 5x}{x}$ B) $y=5x$ C) $y=\dfrac{1}{x-5}$ D) $y=\dfrac{5x}{1-x}$ E) $y=\dfrac{20x^2-x}{1+4x^2}$