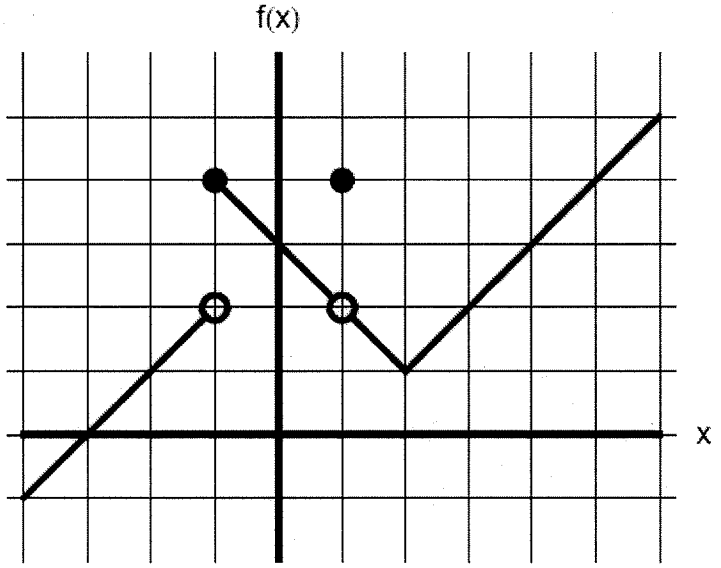
☺ **My Chapter One AP Calculus AB Test** _____

[Limits and Continuity]

A graphing calculator is NOT permitted on this portion of the test

Directions: Solve each of the following problems using the available space for your scratch work. After examining the form of the choices, decide which is the best of the choices and fill in the corresponding bubble on your Scrantron form. No credit will be given for anything in your scratch work. Do not spend too much time on any one problem.



1. The graph of a function f whose domain is the closed interval $[-4, 6]$ is shown *above*. Which of the following statements about $f(x)$ is true?

(A) $\lim_{x \to -1} f(x) = 4$

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

(C) $f(x)$ is continuous at $x = -1$

(D) $f(x)$ is continuous at $x = 1$

(E) $\lim_{x \to 2} f(x) = f(2)$

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

(A) 2
(B) 0
(C) 4
(D) 7
(E) Does not exist

3. Determine $\lim_{x \to \frac{\pi}{4}} \sin x$

(A) 0
(B) 1
(C) $\frac{\sqrt{2}}{2}$
(D) $\sqrt{2}$
(E) $\frac{\sqrt{3}}{2}$

4. Let $f(x) = \begin{cases} x^2 + 4, & x \neq 1 \\ 1, & x = 1 \end{cases}$ and determine $\lim_{x \to 1} f(x)$

(A) 5
(B) 1
(C) 4
(D) 16
(E) Does not exist

5. Determine $\lim_{x \to a} \frac{x^2 - a^2}{x^4 - a^4}$ where $a \neq 0$

(A) $2a^2$
(B) $-2a^2$
(C) $\frac{-1}{2a^2}$
(D) $\frac{1}{2a^2}$
(E) Does not exist

6. Determine $\lim_{x\to 4} \dfrac{x^2+2x-24}{x-4}$

(A) 10
(B) 6
(C) -6
(D) 4
(E) Does not exist

7. If f is a continuous function defined by $f(x)=\begin{cases} x^2+bx, & x\le 1 \\ 5\sin\left(\dfrac{\pi}{2}x\right), & x>1 \end{cases}$ then $b=$

(A) -4
(B) 4
(C) 5
(D) -5
(E) 10

8. If $\lim_{x\to 2} f(x)=3$ and $\lim_{x\to 2} g(x)=5$ then $\lim_{x\to 2}[f(x)+g(x)]=$

(A) 4
(B) 0
(C) -2
(D) 8
(E) $\dfrac{3}{5}$

9. Determine $\lim_{x\to 5} \dfrac{x^3-15x^2+75x-125}{x-5}$

(A) Does not exist
(B) 0
(C) 1
(D) 25
(E) 125

10. Determine $\lim_{x \to 1} \frac{\ln x + 3x}{x}$

(A) 0
(B) 1
(C) e
(D) 2
(E) 3

11. Determine $\lim_{x \to e} \ln x^2$

(A) 0
(B) 1
(C) e
(D) 2
(E) 3

12. Determine $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ when $f(x) = 3x^2$

(A) Does not exist
(B) 0
(C) x
(D) 6x
(E) 9x

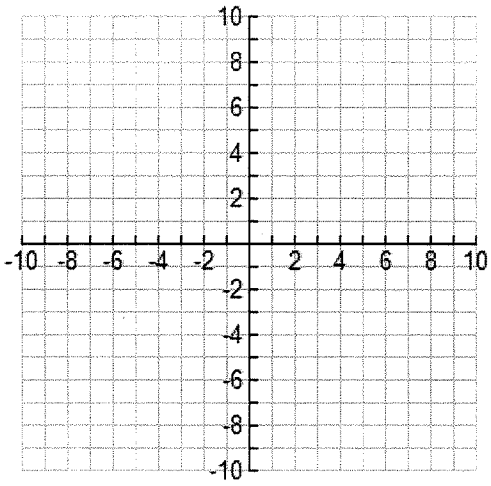
FREE RESPONSE
Show all work in the space provided. All steps must be shown. Indicate clearly the methods you use, because you will be graded on the correctness of your methods as well as the accuracy of your final answers. Correct answers without supporting work ["bald" answers] will NOT receive credit. Justifications require mathematical [non-calculator] reasons. Your work must be expressed in standard mathematical notation. Unless otherwise specified, answers [numeric or algebraic] need not be simplified. If your answer is given as a decimal approximation, it should be correct to three places after the decimal point.

FR1. On the axes provided below, sketch a graph of a function that has all of the following attributes listed below:

I. $\lim_{x \to 3} f(x) = 4$

II. $f(3) = -2$

III. $\lim_{x \to -3} f(x) = \infty$



FR2. $f(x)$ and $g(x)$ are continuous functions for all $x \in$ Reals. The table below has values for the functions for selected values of x. The function $h(x) = g(f(x)) + 2$.

x	$f(x)$	$g(x)$
1	3	4
3	9	-10
5	7	5
7	11	25

Explain why there must be a value c for $1 < c < 5$ such that $h(c) = 0$.