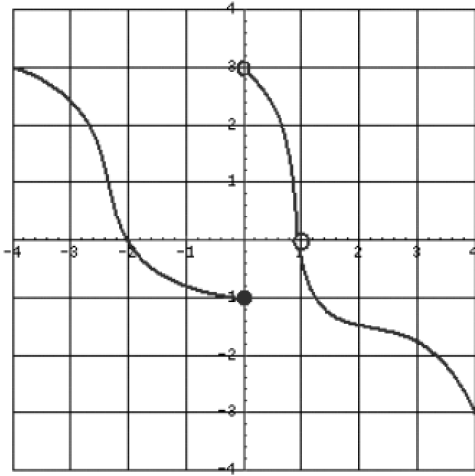AP Calculus AB
Limits & Continuity
TEST

The graph of $f(x)$ is shown. Use the graph to estimate the limits and value of the function.

1. $\lim_{x \to -2} f(x)$ _____
2. $\lim_{x \to 0^-} f(x)$ _____
3. $\lim_{x \to 0^+} f(x)$ _____
4. $\lim_{x \to 0} f(x)$ _____
5. $\lim_{x \to 1} f(x)$ _____
6. $f(-2)$ _____
7. $f(0)$ _____
8. $f(1)$ _____

Find the limit algebraically.

9. $\lim_{x \to 5} 4 = $ _____

10. $\lim_{x \to -1} \left(-2x^2 + 5x - 2\right) = $ _____

11. $\lim_{x \to 1} \dfrac{x^2 - 1}{x - 1} = $ _____

12. $\lim_{x \to 0} \dfrac{4}{x^2} = $ _____

13. $\lim_{x \to \infty} \dfrac{6 - 7x}{x + 3} = $ _____

14. $\lim_{x \to \infty} \dfrac{1}{x} = $ _____

In exercises 15-18, use the following function.

$$f(x) = \begin{cases} 2 - x, x \le 1 \\ \dfrac{x}{2} + 1, x > 1 \end{cases}$$

_____ 15. What is the value of $\lim_{x \to 1^-} f(x)$?

A. 5/2   B. 3/2   C. 1   D. 0   E. DNE

_____ 16. What is the value of $\lim_{x \to 1^+} f(x)$?

A. 5/2   B. 3/2   C. 1   D. 0   E. DNE

_____ 17. What is the value of $\lim_{x \to 1} f(x)$?

A. 5/2   B. 3/2   C. 1   D. 0   E. DNE

_____ 18.   What is the value of $f(1)$?

A. 5/2   B. 3/2   C. 1   D. 0   E. DNE

_____ 19.   Find $\lim_{x\to 3}\frac{x^2-x-6}{x-3}$, if it exists.

A. -1   B. 1   C. 2   D. 5   E. DNE

_____ 20.   Which of the following lines is a horizontal asymptotes for

$$f(x) = \frac{3x^3 - x^2 + x - 7}{2x^3 + 4x - 5}$$

A. $y = \frac{3}{2}x$ B. $y = 0$ C. $y = 2/3$ D. $y = 7/5$ E. $y = 3/2$

_____ 21.   Which of the following values is the slope of the secant line between $x = 0$ and $x = 3$ on the graph of $f(x) = \sqrt{x+1}$?

A. -3   B. -1   C. -1/3   D. 1/3   E. 3

_____ 22.   Which of the following statements is false for the function

$$f(x) = \begin{cases} \frac{3}{4}x, 0 \le x < 4 \\ 2, x = 4 \\ -x + 7, 4 < x \le 6 \\ 1, 6 < x < 8 \end{cases}$$

A. $\lim_{x\to 4} f(x)$ exists   B. $f(4)$ exists   C. $\lim_{x\to 6} f(x)$ exists
D. $\lim_{x\to 8^-} f(x)$ exists   E. f is continuous at x = 4

_____ 23.   Which of the following is an equation for the tangent line to $f(x) = 9 - x^2$ at $x = 2$?

A. $y = \frac{1}{4}x + \frac{9}{2}$ B. $y = -4x + 13$ C. $y = -4x - 3$
D. $y = 4x - 3$ E. $y = 4x + 13$

24.   Let $f(x) = 2x - x^2$.

   a)   Find $f(3)$.   b)   Find $f(3 + h)$

   c)   Find $\frac{f(3+h)-f(3)}{h}$

   d)   Find the instantaneous rate of change of f at $x = 3$.