

AP Calculus: Homework 18

1. For each function, find the equations of all vertical and horizontal asymptotes and find the coordinates of any removable points of discontinuity.

(a) $f(x) = \frac{x^2}{x^2 + x - 6}$

(b) $f(x) = \frac{3x - 2}{\sqrt{2x^2 + 1}}$

(c) $f(x) = \frac{9 - 6x + x^2}{x^2 - 9}$

(d) $f(x) = \frac{x - 9}{\sqrt{4x^2 + 3x + 2}}$

(e) $f(x) = \frac{|x| + 1}{|x| - 1}$

(f) $f(x) = \frac{27x^3 - 1}{3x - 1}$

2. Find a value for the constant k , if possible, that will make the function continuous.

$$f(x) = \begin{cases} kx^3 - 2 & x > 1 \\ 4x^2 - 7x & x < 1 \\ -4 & x = 1 \end{cases}$$

3. Suppose f is continuous on the closed interval $[0, 4]$ and suppose $f(0) = 1$, $f(1) = 2$, $f(2) = 0$, $f(3) = -3$, and $f(4) = 3$. Which of the following statements about the zeros of f on $[0, 4]$ is always true?

- (A) f has exactly one zero on $[0, 4]$.
(B) f has more than one zero on $[0, 4]$.
(C) f has more than two zeros on $[0, 4]$.
(D) f has exactly two zeros on $[0, 4]$.
(E) None of the statements above is true.