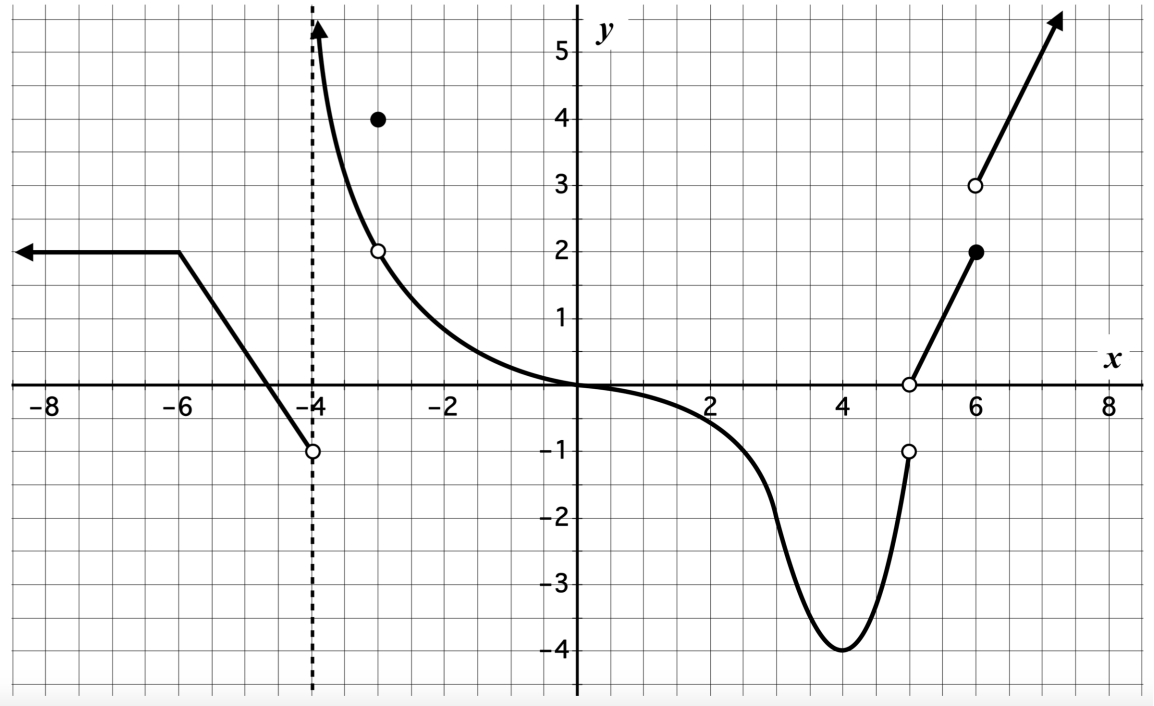
Continuity

1. Answer the following questions based on the graph of f below. Assume that all points of discontinuity and asymptotes can be observed from the graph. Asymptotes are indicated by dotted lines.



Give numeric values for each of the following. If the limit does not exist, write "∞", "$-\infty$", or "DNE", whichever is most appropriate.

$\lim_{x\to 6} f(x) =$ $\lim_{x\to -4^+} f(x) =$ $\lim_{x\to -6} f(x) =$

$\lim_{x\to 5} f(x) =$ $f(6) =$ $\lim_{x\to -3} f(x) =$

(b) Identify all x-values in the interval $[-10, 10]$ where $f(x)$ is defined but f is not continuous.

2. Determine the value of P so that the function f is continuous at $x = -8$, where

$$f(x) = \begin{cases} \dfrac{7(x^2 - 64)}{x + 8}, & \text{if } x \neq -8 \\ P, & \text{if } x = -8 \end{cases}$$

   a. $P = -56$

   b. $P = -112$

   c. $P = \dfrac{8}{7}$

   d. $P = 56$

   e. None of the above.

3. Consider the function g defined by

$$g(x) = \begin{cases} x - 5, & x \leq 8 \\ cx - 7, & x > 8 \end{cases}$$

   Which value of c makes g continuous for all real values of x?

   a. $c = -\dfrac{1}{2}$ b. $c = \dfrac{7}{5}$ c. $c = \dfrac{5}{7}$ d. $c = \dfrac{4}{5}$ e. $c = \dfrac{5}{4}$

4. Consider the function f defined by

$$f(x) = \begin{cases} 3x^2 - 4, & x < 1 \\ 2, & x = 1 \\ 6x - 7, & x > 1 \end{cases}$$

   Which of the following are true statements about this function?

   I. $\lim\limits_{x \to 1} f(x)$ exists

   II. $f(1)$ exists

   III. f is continuous at $x = 1$

   a. I only

   b. I and II

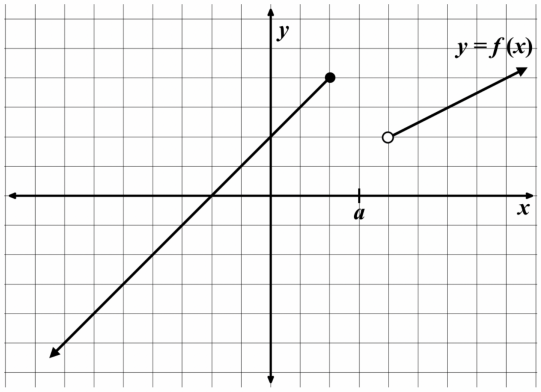
   c. II only

   d. II and III

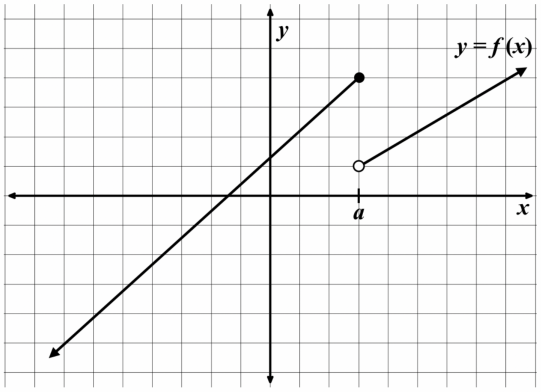
   e. I, II, and III

5. For which of the following graphs does $\lim_{x \to a} f(x)$ exist?

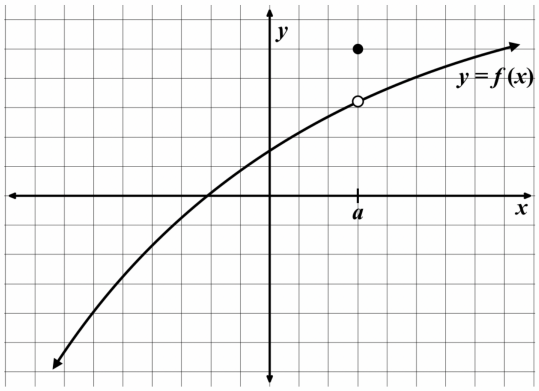
I.



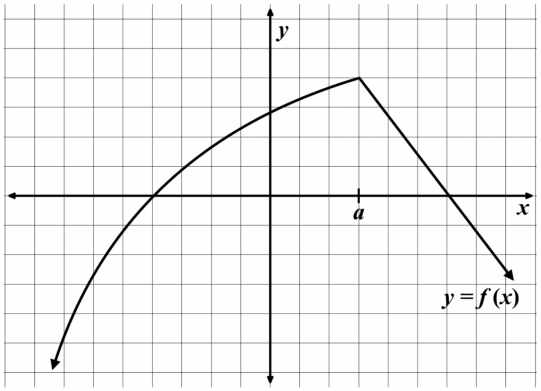
II.



III.



IV.



a. IV only

b. III and IV only

c. II, III, and IV only

d. I, II, III, and IV

e. None of these