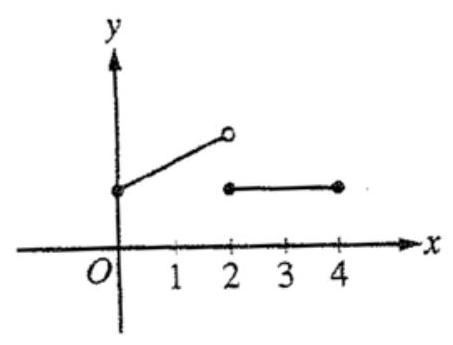
## Multiple Choice

1. (calculator not allowed)
   1. 0
   2. 1
   3. 4
   4. nonexistent
2. (calculator not allowed) The is
   1. 0
   2. nonexistent
3. (calculator not allowed)
   1. 6
   2. 2
   3. 1
   4. 0
4. (calculator not allowed) At , the function given by is
   1. undefined.
   2. continuous but not differentiable.
   3. differentiable but not continuous.
   4. neither continuous nor differentiable.
   5. both continuous and differentiable
5. (calculator allowed) . The figure above shows the graph of a function with domain . Which of the following statements are true? I. exists II. exists III. exists
   1. I only
   2. II only
   3. I and II only
   4. I and III only
   5. I, II, and III
6. (calculator not allowed) If , then is
   1. 0
   2. 1
   3. 2
   4. 4
   5. nonexistent
7. (calculator not allowed) If and for all , and if , then is
   1. 1
   2. 0
   3. -1
   4. nonexistent
8. (calculator not allowed)

* Let be the function defined above. Which of the following statements about are true? I. II. III. is differentiable at
  1. I only
  2. II only
  3. II and III only
  4. I, II, and III

1. (calculator not allowed) If where is a real number, which of the following must be true?
   1. exists.
   2. is continuous at .
   3. is defined at .
   4. None of the above
2. (calculator not allowed) For , the horizontal line is an asymptote for the graph of the function . Which of the following statements must be true?
   1. for all
   2. is undefined.
3. (calculator not allowed) If the graph of has a horizontal asymptote at and a vertical asymptote at , then
   1. -5
   2. -1
   3. 0
   4. 1
   5. 5
4. (calculator not allowed) is
   1. -3
   2. -2
   3. 2
   4. 3
   5. nonexistent
5. (calculator not allowed) Let be the function defined above. Which of the following statements about are true?   
   I. has a limit at .

II. is continuous at .

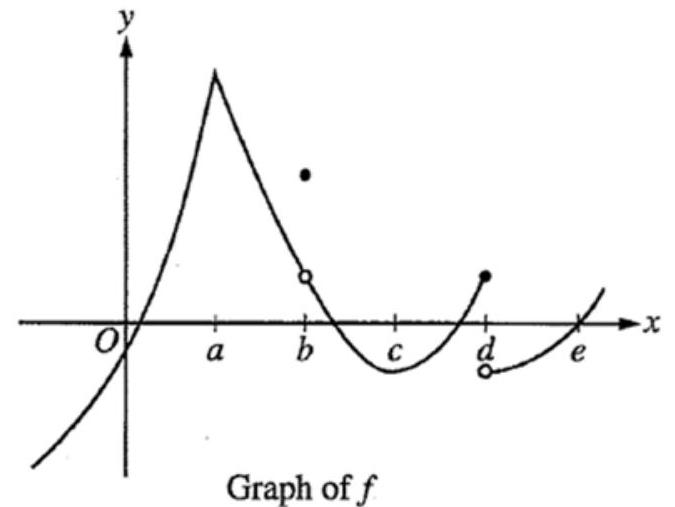
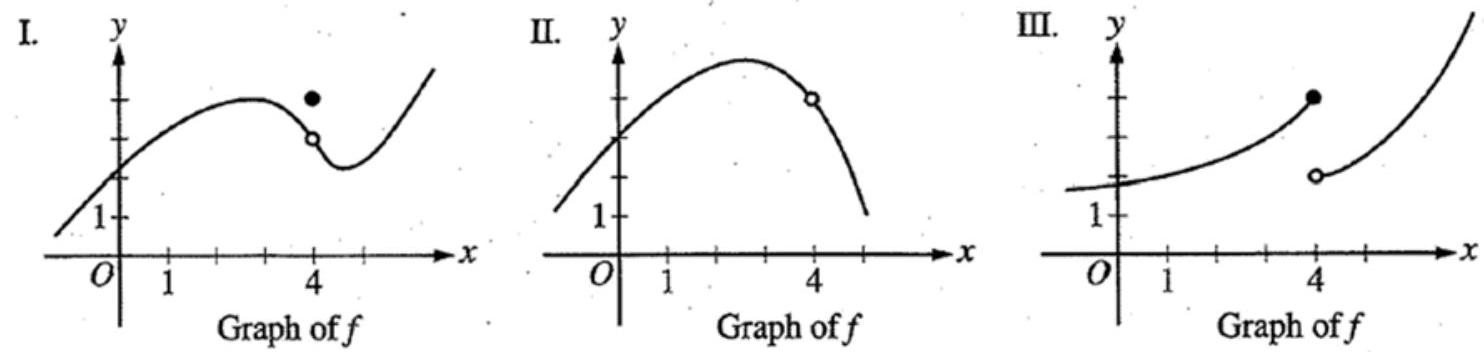
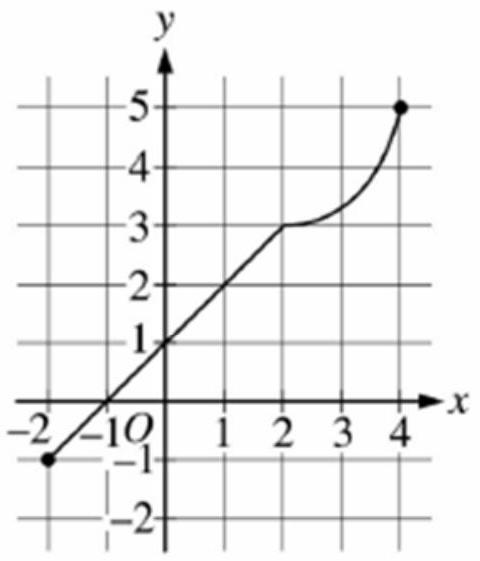
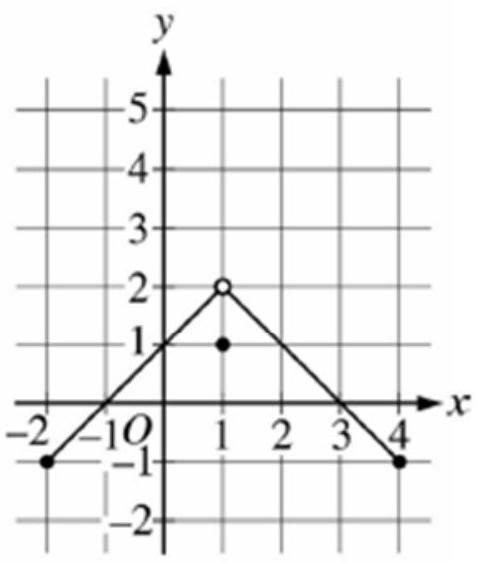
III. is differentiable at .

(a) I only (a) II only (a) III only (a) I and II only (a) I, II, and III



Let be the function given above. What are all values of and for which is differentiable at ?

* 1. and
  2. and
  3. and is any real number
  4. , where is any real number
  5. There are no such values of and

1. (calculator not allowed) If the function is continuous for all real numbers and if when , then
   1. -4
   2. -2
   3. -1
   4. 0
   5. 2
2. (calculator not allowed)  The graph of a function is shown above. At which value of is continuous, but not differentiable?
3. (calculator allowed)  For which of the following does exist?
   1. I only
   2. II only
   3. III only
   4. I and II only
   5. I and III only
4. (calculator not allowed) is
   1. 1
   2. Nonexistent  
        Graph of  Graph of
5. The graphs of the functions and are shown above. The value of is
   1. 1
   2. 2
   3. 3
   4. nonexistent