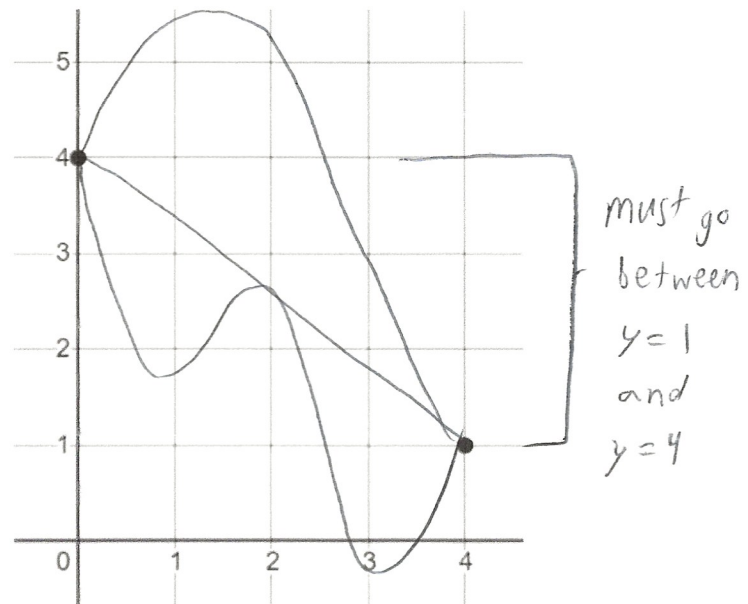




## Problem Set 5: Intermediate Value Theorem

1. A continuous function  $f(x)$  passes through the points  $(0,4)$  and  $(4,1)$ . Which of the following  $y$  points must  $f(x)$  pass through? (Circle all that apply)

- a) 0
- b) 1
- c) 2
- d) 3
- e) 4
- f) 5



2.  $f(x)$  is a continuous function with points  $(2, -2)$  and  $(8,5)$ .

Which of the following statements **must** be true? (Circle all that apply)

- a) There must be at least one point between  $x = 2$  and  $x = 8$  with a  $y$ -value of 1. True (IVT)
- b)  $f(x)$  has exactly one solution between  $x = 2$  and  $x = 8$ . *passes x-axis only once → not necessarily true*
- c)  $f(x)$  has more than one solution between  $x = 2$  and  $x = 8$ . *passes x-axis multiple times → not always true*
- d)  $f(x)$  cannot be greater than 5 or less than  $-2$  between those  $x$ -values. *Yes it can! Just look at the graph.*
- e) The limit must exist at  $x = 2$  and  $x = 8$ . Since  $f(x)$  is continuous, the limit must exist
- f) The limit must exist everywhere between  $x = 2$  and  $x = 8$ . *Same as e)*

