

## Exam 1 Review - Worksheet 2

①  $f$  continuous on  $[-1, 3]$ , and  $f(-1) = -3$ ,  $f(3) = 2$ .  
Which is guaranteed by IVT?

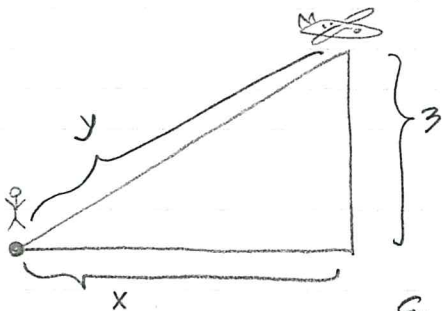
- ✗ (a)  $f(c) = 4$  for at least one  $c$  b/w  $-3$  and  $2$ . (4 is not b/w  $-3$  &  $2$ )
- ✗ (b)  $f(c) = 1$  for at least one  $c$  b/w  $-3$  and  $2$ . (IVT would guarantee  $c$  in  $(-1, 3)$ )
- ✓ (c)  $f(c) = 1$  for at least one  $c$  b/w  $-1$  and  $3$ .
- ✓ (d)  $f(c) = 0$  for at least one  $c$  b/w  $-1$  and  $3$ .
- ✗ (e)  $f(c) = -1$  for at least one  $c$  b/w  $-3$  and  $2$ . (IVT would guarantee  $c$  in  $(-1, 3)$ )

I. b & e      III. a, b & e  
 → II. c & d      IV. c, d & e

② On which of the following intervals must there be a solution to the equation  $x^2 - 4 = \sqrt{x}$ ?

- (a)  $(0, 1)$
  - (b)  $(1, 2)$
  - (c)  $(2, 3)$
  - (d)  $(3, 4)$
  - (e)  $(4, 5)$
- $f(x) = x^2 - \sqrt{x} - 4 = 0$
- $f(0) = -4 < 0$   
 $f(1) = -4 < 0$   
 $f(2) = -\sqrt{2} < 0$   
 $f(3) = 5 - \sqrt{3} > 0$   
 $f(4) = 10 > 0$   
 $f(5) = 21 - \sqrt{5} > 0$
- } b/w  $(2, 3)$

③



$x(t)$  = distance traveled by plane;  
 $y(t)$  = distance b/w person & plane  
 $\frac{dx}{dt} = 500$  (mph)

Q:  $\frac{dy}{dt} \Big|_{x=4} = ?$

Eqn.:

$$x^2 + 3^2 = y^2$$

$$2x \frac{dx}{dt} = 2y \frac{dy}{dt}$$

$$\frac{dy}{dt} = \frac{x}{y} \frac{dx}{dt}$$

When  $x = 4$ :  $y^2 = 16 + 9 = 25$   
 $y = 5$

$$\frac{dy}{dt} \Big|_{x=4} = \frac{4}{5} \cdot 500 = \underline{\underline{400}} \text{ mph.}$$