

Name: .....

MATH-165 Puzzle Collection 3 - makeup

23 12:10pm-Wumaier 24 12:10pm-Njus

2016 Sep 30 12:10pm-1:00pm

25 1:10pm-Wumaier 26 1:10pm-Njus

27 2:10pm-Wumaier 28 2:10pm-Njus

This puzzle collection is closed book and closed notes. No sophisticated calculator is allowed for these puzzles. For full credit show all of your work (legibly!). Every puzzle is worth 10 points (a total of 50 points).

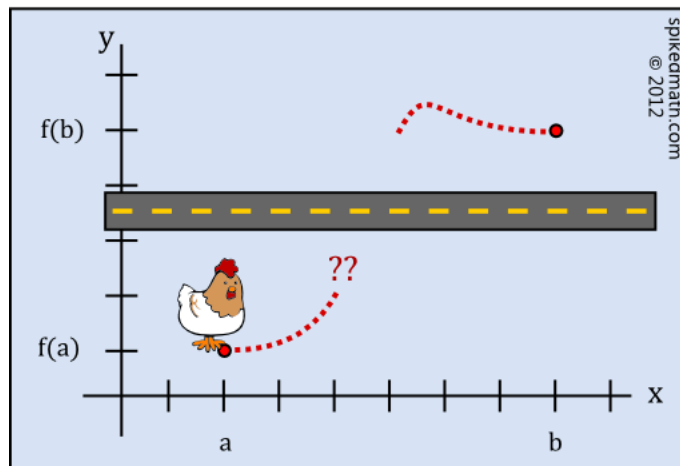
If you do not mark your section correctly, you will get -2 points.

Good luck!

Puzzle 1	Puzzle 2	Puzzle 3	Puzzle 4	Puzzle 5
/10	/10	/10	/10	/10

Total score
/50

WHY DID THE CHICKEN CROSS THE ROAD?



THE INTERMEDIATE VALUE THEOREM.

**1:** Given the recent problems of the bottom of ladders sliding away from the wall the company has recently installed a collapsible ladder and permanently screwed the bottom of the ladder so that it will always be six feet from the wall. At a particular moment the ladder has been extended to be ten feet in length but the mechanism to lock the ladder in place is not working and so the ladder is slowly collapsing. Given that the ladder is moving down the wall at a rate of two feet per minute, how quickly is the length of the ladder changing?

**2:** Find linearization of  $f(x) = \ln(x^2 + x - 1) + 5e^{x-1} - 2x^2 + 4$  at  $x = 1$ , use this to give an *estimate* for  $f(1.1)$ .

**3:** Determine the absolute maximum and minimum for  $f(x) = 1 - |x^2 - 5x - 6| + x$  for  $0 \leq x \leq 7$ .

**4:** Find and classify the critical points for the function  $y = 2\sqrt{x+9} - \sqrt{x}$  with  $x \geq 0$ . Explain why one of these critical points is not only a local max or min but is also an absolute max or min.

**5:** Use Newton's method to approximate a solution to  $x^3 = 5 + 5x$  starting with  $x_0 = 2$  and giving exact values for  $x_1$  and  $x_2$ .