Name_____ Date_____ Period_____

Worksheet 3.3—Intermediate Value Theorem

Show all work. Round all answers to 3 decimal places. **Calculator IS permitted.**

1. Using the IVT
   (a) prove that $f(x) = x^2 - 2$ has a zero between 1 and 2

   (b) find this zero
      (i) graphically using your graphing calculator. Sketch the graph below.

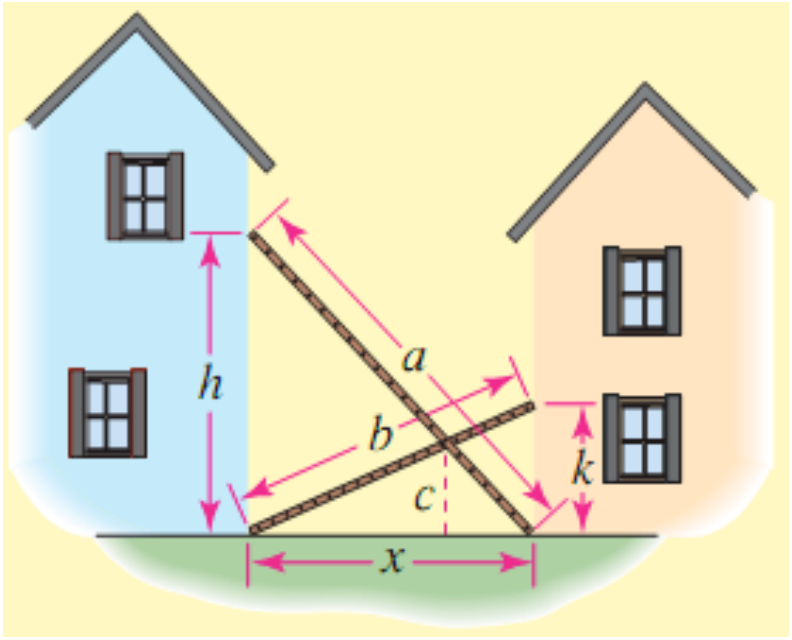
      (ii) algebraically.

2. Explain why we cannot use the IVT to prove that for the function $f(x)=\frac{3}{2-x}$, there exists an $x=c$, $c\in[1,3]$, such that $f(c)=0$.

3. Prove that the polynomial has a root between the given integers, and then approximate that zero graphically to 3 decimal places.
   (a) $f(x)=x^3+x-7$ on $[1,2]$ (b) $h(t)=2t^4-4t^2+1$ on $[-1,0]$

4. **(You will need a ruler to do this problem. Scale everything in inches.)** In a passageway between two buildings, two ladders are propped up from the base of each building to the wall of the other so that they cross, as shown in the figure. If the ladders have lengths $a = 3$ m and $b = 2$ m and the crossing point is at height $c = 1$ m, then it can be shown that the distance x between the buildings is a solution of the equation

$$x^8 - 22x^6 + 163x^4 - 454x^2 + 385 = 0$$



(a) This equation has two positive solutions, which lie between 1 and 2. Use your graphing calculator to approximate these solutions correct to three decimals.

(b) Draw two scale diagrams, like the figure, one for each of the two values of x. Approximate the height of the crossing point, c, for each. Which value of x seems to be the correct one? Does one of them appear to be extraneous? Why do you think that is?