

9. [15 points] Suppose that $W(h)$ is an invertible function which tells us how many gallons of water an oak tree of height h feet uses on a hot summer day.

a. [9 points] Give practical interpretations for each of the following quantities or statements.

- $W(50)$

Solution: The expression $W(50)$ represents how many gallons of water a 50 foot tall oak tree uses on a hot summer day.

- $W^{-1}(40)$

Solution: The expression $W^{-1}(40)$ represents the height of an oak tree (in feet) which uses 40 gallons of water on a hot summer day.

- $W'(5) = 3$

Solution: An oak tree which is 6 feet tall uses approximately 3 more gallons of water per hot summer day than a 5 foot tall oak tree does.

OR

If a 5 foot tall oak tree grew an extra foot, it would use approximately 3 more gallons of water per hot summer day.

b. [6 points] Suppose that an average oak tree is A feet tall and uses G gallons of water on a hot summer day. Answer each of the questions below **in terms of the function W** . You may also use the constants A and/or G in your answers.

- A farmer has a grove with 25 oak trees, and each one is 10 feet taller than an average oak tree. How much water will be used by his trees during a hot summer day?

Solution: $25W(A + 10)$ gallons

- The farmer also has some oak trees which each use 5 fewer gallons of water on a hot summer day than an average oak tree does. How tall is one of these trees?

Solution: $W^{-1}(G - 5)$ feet