7. [10 points] Kimoi is going to hold an Autumn Festival at her store next year. She wants to make and provide free carrot juice to her customers using carrots from her garden.

- Let $c(w)$ be the amount of carrots, measured in pounds, that grow when she gives her carrot garden w gallons of water during the growing season.
- Let $j(v)$ be the amount of carrot juice, measured in gallons, that she can make from v pounds of carrots.

The functions $c(w)$ and $j(v)$ are both invertible and differentiable.

a. [2 points] Write a complete sentence that gives a practical interpretation of the equation

$$c^{-1}(38) = 620.$$

Solution: To grow 38 pounds of carrots, Kimoi needs to give her garden 620 gallons of water.

b. [2 points] Write an equation involving c, j, and/or their inverses that represents the following statement.

If Kimoi gives her garden 1120 gallons of water, then she can produce 10 gallons of carrot juice.

Answer: $j(c(1120)) = 10$

c. [3 points] Complete the following sentence to give a practical interpretation of the equation

$$c'(900) = 0.2.$$

If Kimoi gives her carrot garden 903 gallons of water rather than 900 gallons of water, then...

Solution: ... she will be able to grow about 0.6 additional pounds of carrots.

d. [3 points] Write the roman numeral of the <u>one</u> sentence below that gives a valid interpretation of the equation

$$(j^{-1})'(10) = 18.$$

  i. If Kimoi has 11 pounds of carrots instead of 10 pounds, then she can make approximately 18 more gallons of carrot juice.

 ii. To make 10 gallons of carrot juice instead of 9.5, Kimoi will need to give her garden about 9 additional gallons of water.

iii. If Kimoi increases her carrot yield from 18 pounds to 19 pounds, then she can make about 10 more gallons of carrot juice.

 iv. If Kimoi wants to increase the amount of carrot juice she makes from 10 gallons to 10.5 gallons, then she needs about 9 more pounds of carrots.