2. [9 points] Your construction company is building an apartment complex with a fixed number of individual apartment units that are all the same size.

- Let $C(a)$ be the cost, in millions of dollars, to construct the apartment complex when each unit has a square feet of space.
- Let $A(u)$ be the size of each apartment unit, in square feet, if u thousand pounds of bricks are used in the construction of the apartment complex.

Assume the functions $C(a)$ and $A(u)$ are invertible and differentiable.

a. [2 points] Fill in the blanks with appropriate *numbers and units* to give a practical interpretation of the equation $A^{-1}(508) = 68$.

In order to build the apartment complex so that each unit has a size of 508 *square feet*,

you will need to use 68,000 *pounds of bricks.*

b. [2 points] Write an expression involving A, C, and/or their inverses that represents the following statement:

If the apartment building uses 72,000 pounds of bricks, then it costs 2.8 million dollars to construct the building.

Answer: $C(A(72)) = 2.8$

c. [2 points] Complete the following sentence to give a practical interpretation to the equation

$$A'(73) = 2.$$

If 73,500 pounds of bricks were used to construct the apartment building rather than 73,000, then . . .

Solution: . . . each apartment unit would be about 1 square foot larger.

d. [3 points] Circle the one statement below that is best supported by the equation

$$(C^{-1})'(290) = 3.$$

i. If the amount spent constructing the building is increased to \$310 million from \$290 million, then the size of each apartment increases by 60 square feet.

ii. If the amount of floor space in each apartment is 300 square feet rather than 290 square feet, then the cost to construct the building increases by about 30 million dollars.

iii. If the cost of constructing the apartment complex must be cut from \$295 million to \$290 million, then each unit will have to decrease in size by about 15 square feet.

iv. To increase the floor space in each apartment by about 3 square feet, the amount spent in construction needs to be increased by \$1 million dollars.