

4. [14 points] One of the ways Captain Christina likes to relax in her retirement is to go for long walks around her neighborhood. She has noticed that early every Tuesday morning, a truck delivers butter to a local bakery famous for its cookie dough. Consider the following functions:
- Let $C(b)$ be the bakery's cost, in dollars, to buy b pounds of butter.
 - Let $K(b)$ be the amount of cookie dough, in cups, the bakery makes from b pounds of butter.
 - Let $u(t)$ be the instantaneous rate, in pounds per hour, at which butter is being unloaded t hours after 4 am.

Assume that C , K , and u are invertible and differentiable.

- a. [2 points] Interpret $K(C^{-1}(10)) = 20$ in the context of this problem. Use a complete sentence and include units.

- b. [3 points] Interpret $\int_5^{12} K'(b) db = 40$ in the context of this problem. Use a complete sentence and include units.

- c. [3 points] Give a single mathematical equality involving the derivative of C which supports the following claim:
It costs the bakery approximately \$0.70 less to buy 14.8 pounds of butter than to buy 15 pounds of butter.

Answer: _____

- d. [3 points] Give a single mathematical equality which expresses the following claim:
The number of pounds of butter unloaded between 5 and 8 am is twice as many as the bakery needs to make 5000 cups of cookie dough.

Answer: _____

- e. [3 points] Assume that $u(t) > 0$ and $u'(t) < 0$ for $0 \leq t \leq 4$ and that $u(2) = 800$. Rank the following quantities in order from least to greatest by filling in the blanks below with the options I-IV.

I. 0 II. 800 III. $\int_1^2 u(t) dt$ IV. $\int_2^3 u(t) dt$

_____ < _____ < _____ < _____