5. [0 points] At concerts put on by the band Emergency Kittens, the band tours with kittens that are available for adoption, and plays soothing music while concert-goers play with the kittens.

- $K = g(t)$ is the number of kittens traveling with the band t days into their tour.
- $S = h(K)$ is the amount of time, in hours per day, that band members spend snuggling with kittens when they are traveling with K kittens.
- $h^{-1}(S)$ is a function. (That is, $h(K)$ is invertible.)
- Some values of t and K are given in the table below.

t	3	5	8	9
K	18	22	23	22

a. [3 points] Based on the information in the table, could t be a function of K? Briefly explain your answer.

Answer*(circle one):*

Yes (t could be a function of K) **No** (t could **not** be a function of K)

Explanation:

Solution: If t were to be a function of K then the "input" $K = 22$ would have two outputs: $t = 5$ and $t = 8$. Thus, there is not one unique output for every input and we cannot have t as a function of K.

b. [4 points] Using the table, find the average rate of change of $g(t)$ from $t = 3$ to $t = 8$, and interpret your answer in the context of the problem.

Solution: We use

$$\text{average rate of change} = \frac{K(8) - K(3)}{8 - 3} = \frac{5}{5} = 1.$$

Answer: **1 kitten/day**

Interpretation:
From day 3 of the tour to day 8 of the tour the band increases the number of kittens traveling with them by an average of 1 kitten per day.

c. [9 points] For each of the following, either give a practical interpretation of the mathematical expression, or explain why it doesn't make sense in the context of the problem.

(i) $g(10) = 25$

Solution: 10 days into the tour the band had 25 kittens traveling with them.

(ii) $h(g(4))$

Solution: $h(g(4))$ is the amount of time the band spends snuggling with kittens when they have been on tour for 4 days.

(iii) $h^{-1}(5) \geq 8$

Solution: When the band spends 5 hours per day snuggling with kittens, they are traveling with at least 8 kittens.