6. [9 points] Chuck made a new mathematical model to relate the time of the day and the number of customers at the farmers' market. His model $N(t)$, predicts the number of customers at the market t hours after 6:30 am, the time at which he normally arrives. We have the following table of values for $N(t)$.

t	0	3	4	5	7
$N(t)$	132	105	120	124	88

Between consecutive values of t in the table, assume that $N(t)$ is either only increasing or only decreasing, and assume that it does not change concavity between consecutive t-values in the table. Also assume that the domain of $N(t)$ is $[0, 7]$.

a. [2 points] What is the largest interval over which $N(t)$ could be concave up? Circle your final answer.

Solution:

$$[0, 4]$$

b. [2 points] What is the largest interval over which $N(t)$ could be concave down? Circle your final answer.

Solution:

$$[3, 7]$$

c. [5 points] On one particular Saturday, Chuck learns that there will be a group of 25 additional customers arriving at the market at 10:45 am and leaving at 12:30 pm. He wishes to write a function $P(t)$ to model the number of customers at the market t hours after his arrival on this particular Saturday. Write a piecewise-defined formula for $P(t)$ in terms of the original model $N(t)$. Circle your final answer.

Solution: At 10:45 am, we have $t = 4.25$ and at 12:30 pm, we have $t = 6$. We therefore have the formula

$$P(t) = \begin{cases} N(t) & 0 \le t < 4.25 \\ N(t) + 25 & 4.25 \le t < 6 \\ N(t) & 6 \le t \le 7. \end{cases}$$