7. [11 points] The players on the U-M football team rehydrate during the 20 minute halftime break. Suppose that during the first game of the 2014 season, researchers in the athletic department tracked the team's consumption of sports drink during halftime. Every time another 6 gallons of sports drink was consumed by the players, the time was recorded. Some of the data is provided below.

total amount of sports drink consumed by team (in gallons)	0	6	12	18	24
time since the start of halftime (in minutes)	0	0.6	2.4	5.2	10.0

Let $G(t)$ be the total number of gallons of sports drink the team consumed during the first t minutes of halftime. Assume that $G(t)$ is continuous and differentiable.

a. [3 points] Recall that halftime is 20 minutes long. Suppose that the average rate at which the football team consumed sports drink during the last 10 minutes of halftime is 0.7 gallons per minute. Find $G(20)$. *Remember to show your work clearly.*

Solution: The team consumed

$$(0.7 \text{ gallons/minute})(10 \text{ minutes}) = 7 \text{ gallons}$$

during the last 10 minutes of halftime. Thus, $G(20) = G(10) + 7 = 24 + 7 = 31$.

Answer: $G(20) =$ 31

b. [2 points] Which of the following statements is best supported by the data in the table? *Circle the* ONE *best answer.*

i. $G'(t)$ is an increasing function.

ii. $G'(t)$ is a decreasing function.

iii. $G'(t)$ is a constant function.

c. [3 points] Approximate the instantaneous rate at which the football team was consuming sports drink 8 minutes after the start of halftime.
Include units, and remember to show your work clearly.

Solution: This is given by

$$G'(8) \approx \frac{G(10) - G(5.2)}{10 - 5.2} = \frac{24 - 18}{10 - 5.2} = 1.25 \text{ gallons/minute}$$

Answer: 1.25 **gallons/minute**

d. [3 points] Assume that $G(t)$ is invertible and that G^{-1} is differentiable. Approximate $(G^{-1})'(3)$. *Remember to show your work clearly.*

Solution:

$$(G^{-1})'(3) \approx \frac{G^{-1}(6) - G^{-1}(0)}{6 - 0} = \frac{0.6 - 0}{6 - 0} = 0.1 \text{ minutes/gallon}$$

Answer: $(G^{-1})'(3) \approx$ 0.1 **minutes/gallon**