6. [11 points] Aziza and Zainab are former Math 115 students at a prestigious weather forecasting company near Cloudytown, MI. Each using different meteorological instruments, they’ve recorded the rainfall over Cloudytown during a storm. They’ve let \( F(t) \) be the total rainfall, in inches, \( t \) hours after the start of the storm. They collected the following data.

Aziza’s data: \( F(0) = 0, F(1) = 0.3, \) and \( F(2) = 0.5. \)

Zainab’s data: \( F'(0) = 0.6, F'(1) = 0.7, \) and \( F'(2) = 0.3. \)

a. [4 points] Use Aziza’s data (and not Zainab’s data) to estimate how quickly the rain was falling, in inches per hour, at the start of the storm (time \( t = 0 \)) and after one hour (\( t = 1 \)).

\[
F'(0) \approx \frac{F(1) - F(0)}{1 - 0} = 0.3.
\]

Similarly, the rainfall rate after one hour is approximated by

\[
F'(1) \approx \frac{F(2) - F(1)}{2 - 1} = 0.2.
\]

(Note: Several answers are acceptable for the second part.)

\[ t = 0 : 0.3 \text{ in/hr} \quad t = 1 : 0.2 \text{ in/hr} \]

b. [4 points] (True or False) Circle “T” (True) or “F” (False) for each of the statements below.

- Assuming all the data gathered was correct, throughout the second hour of the storm it was raining at a rate of about 0.7 inches per hour. \( F \)
- Assuming all the data gathered was correct, during the first hour of the storm rainfall slowed down and later sped up again. \( T \)
- Either Aziza’s instrument or Zainab’s instrument must be faulty because their measurements give different values for \( F'(0) \) and \( F'(1) \). \( F \)
- Assuming all the data gathered was correct, since \( F'(0) = 0.6 \) we know that about 0.6 inches of rain fell in the first hour. \( F \)

c. [3 points] Give a practical interpretation of \( F'(0) = 0.6 \) that begins, “During the first five minutes of the storm...”.

\[
F'(0) = 0.6 \text{ means the rainfall rate is } 0.6 \text{ in/hr at the beginning of the storm. There are twelve five minute periods in an hour, so this rate is equivalent to 0.05 inches per 5 minutes. This means our interpretation should be “During the first five minutes of the storm, approximately 0.05 inches of rain fell.”}
\]