

4. [10 points] Let $W = f(t)$ be the amount of water, in gallons, in a bathtub at time t , in minutes. Suppose that Anna turns on the water in the bathtub at time $t = 0$. After exactly 6 minutes, Anna turns off the water and proceeds to bathe her new puppy, Asta. Asta loves the water and doesn't splash or fuss, so Anna has the opportunity to give her a good shampoo. After a 10 minute bath, Anna pulls the plug, and the bathtub takes exactly 4.5 minutes to empty. Because Asta sheds, the water drains quickly at first and then the draining slows down. Anna keeps clearing the hair to assist the draining.
- a. [3 points] For which values of t between 0 and 25 is the quantity $\frac{dW}{dt}$...
- positive?
 - zero?
 - negative?
- b. [2 points] Suppose that the line tangent to the graph of $W = f(t)$ at $t = 18$ passes through the points $(17, 17.5)$ and $(18.5, 4)$. Find $f'(18)$ and include units with your answer.
- c. [2 points] Find $f(18)$ and include units with your answer.
- d. [3 points] Use your answers from (b) and (c) to estimate $f(20)$. Explain, in practical terms, why this estimate is or is not reasonable.