

4. [15 points] A patient is given 100 mg of an experimental drug. It has been estimated that the rate $f(t)$ at which his body eliminates the drug is given in the following table. Values of t are in hours after the administration of the drug and $f(t)$ is measured in mg/hour.

t	0	0.5	1.0	1.5	2
$f(t)$	17.3	14.5	12.2	10.3	8.6

Assume $f(t)$ is continuous with no critical points or points of inflection in $0 \leq t \leq 2$. Make sure to include the appropriate units in your answers below.

- a. [4 points] Use each left, right, trapezoid and midpoint sums to estimate amount of drug eliminated after 2 hours. When calculating each sum, use the maximum number of subdivisions possible. Show all the terms in each sum.

- b. [4 points] Using the computations in a), what is the best overestimate you can find for the amount of drug removed from the patient's body after 2 hours? What is the best underestimate? Justify your answers.

- c. [4 points] Using left and right hand sums, how often do we have to measure $f(t)$ in $0 \leq t \leq 2$ to obtain an estimate of the amount of drug eliminated from the patient's body after 2 hours within 0.1 mg of its actual value?
- d. [3 points] Find a formula for $g(t)$, the amount of drug (in mg) left in the patient's body after t hours of being administered.