2. [14 points] Let $f(x)$ be a continuous function on $0 \leq x \leq 2$. The values of $f(x)$ are shown below

x	0	0.5	1	1.5	2
$f(x)$	-3	-2	1	3	4

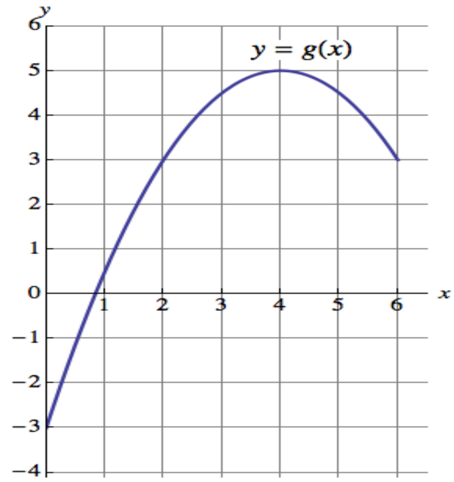
a. [2 points] Use the left-hand sum with four subintervals to approximate the value of $\int_0^2 f(x)dx$. Show all the terms in the sum, and then calculate the numerical value.

b. [2 points] Assume that $f(x)$ has no critical points for $0 \leq x \leq 2$. Is your estimate in (**a**) guaranteed to be an underestimate or overestimate of $\int_0^2 f(x)dx$, or there is not enough information to decide? Justify.

c. [2 points] Use the trapezoid rule with four subintervals to approximate the value of $\int_0^2 f(x)dx$. Show all the terms in the sum, and then calculate the numerical value.

d. [2 points] Given the data for $f(x)$, is your estimate in (**c**) guaranteed to be an underestimate or overestimate of $\int_0^2 f(x)dx$, or there is not enough information to decide? Justify.

e. [2 points] Consider the function $g(x)$ whose graph is shown below



Use the midpoint rule with three subintervals to approximate the value of $\int_0^6 g(x)dx$. Show all the terms in the sum, and then calculate the numerical value.

f. [2 points] Use the right-hand sum with three subintervals to approximate the value of $\int_1^3 e^{\sqrt{t}}dt$. Show all the terms in the sum, and then calculate the numerical value.

g. [2 points] Is your estimate in (**f**) guaranteed to be an underestimate or overestimate of $\int_1^3 e^{\sqrt{t}}dt$, or there is not enough information to decide? Justify.