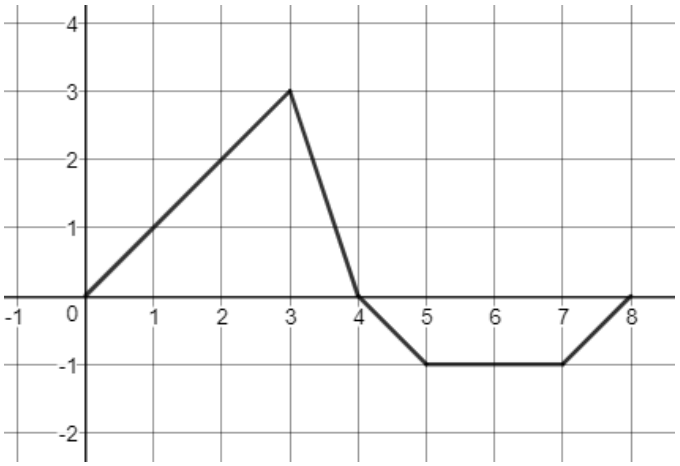
6.5 Trapezoidal Sums

Example: Given the following graph of the function $f(x)$



1. What is $\int_0^5 f(x)\,dx$?

2. What is $f'(2)$? $f'(6)$?

3. If $h(x) = \int_0^8 f(x)\,dx$, what is h'(3)?

Area of a Trapezoid: $A = \frac{1}{2}h(b_{1+}b_2)$

Trapezoidal Rule: To approximate $\int_a^b f(x)\,dx$ use

$$T = \frac{b-a}{2n}(y_0 + 2y_1 + 2y_2 + \cdots + 2y_{n-1} + y_n)$$

Where [a, b] is partitioned into n subintervals of equal length h = (b-a)/n.
Equivalently,

$$T = \frac{LRAM_n + RRAM_n}{2}$$

Where LRAM and RRAM are the Riemann sums using left and right end points, respectively, for f for the partition.

Examples:

1. Use a trapezoidal sum with four subintervals to estimate $\int_1^2 x^2 dx$.

2. Evaluate $\int_1^2 x^2 dx$ without a calculator.

3. How does your estimate in part 1 compare to the exact value found in part 2?

4. Use the function values in the following table and the Trapezoidal Rule with n= 6 to approximate $\int_2^8 f(x)dx$

x	2	3	4	5	6	7	8
$f(x)$	16	19	17	14	13	16	20