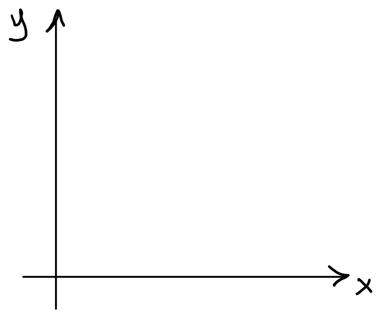
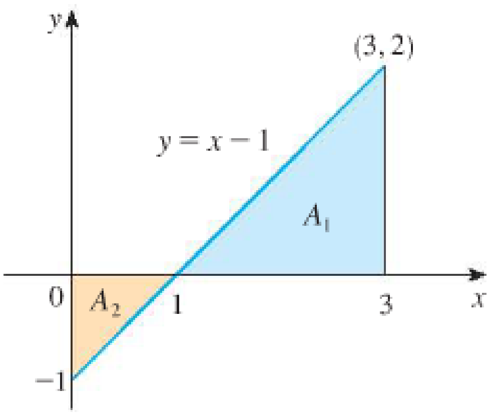
sometimes slices are over- AND under-estimations:



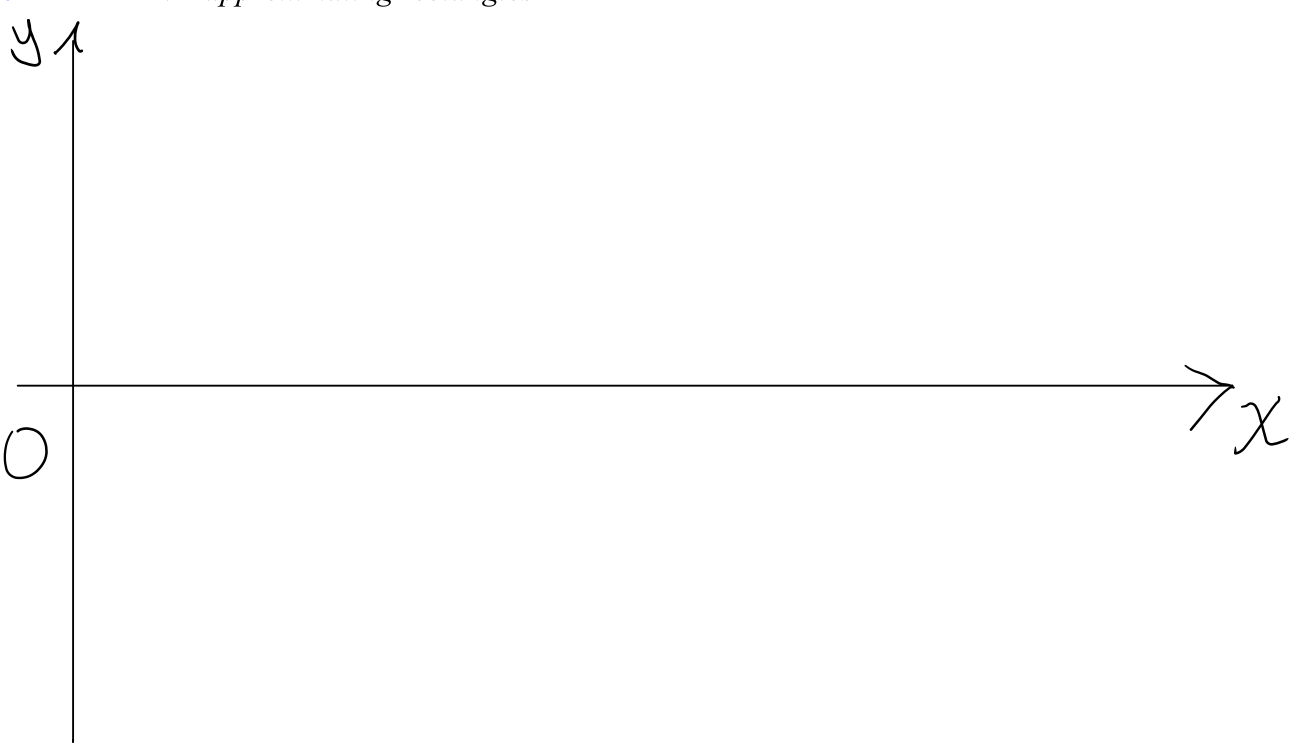
Recall: If area lies **BELOW** x-axis, that region is **negative** (subtracted).



Total area of shaded regions:

ex. SET UP the area under $f(x) = \sin x$ from $x = 0$ to $x = \frac{3\pi}{2}$ *using:*

6 *LEFT-HAND approximating rectangles*

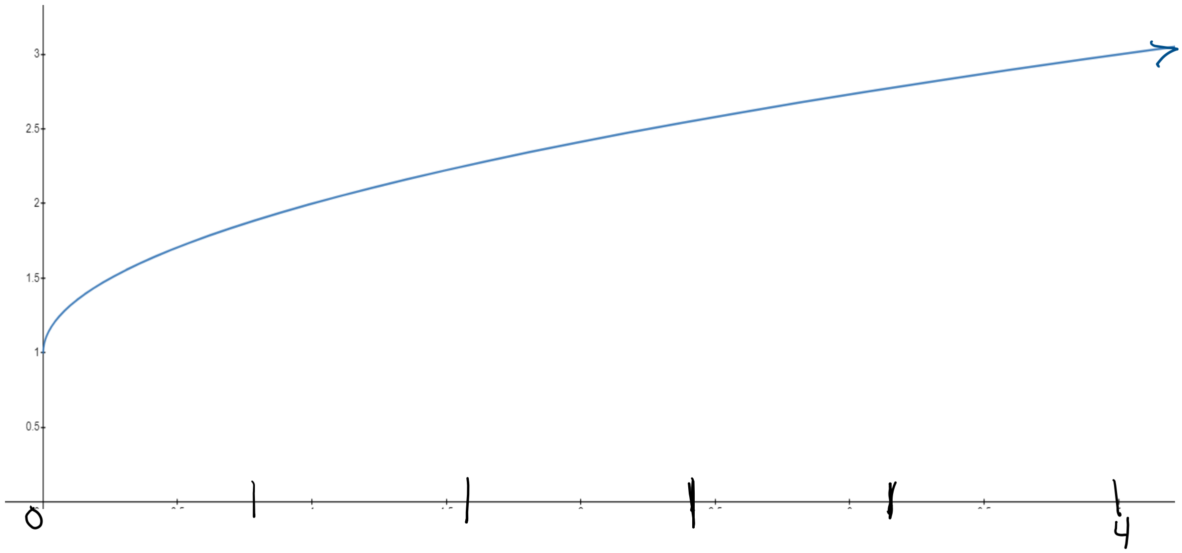


6 *RIGHT-HAND approximating rectangles*

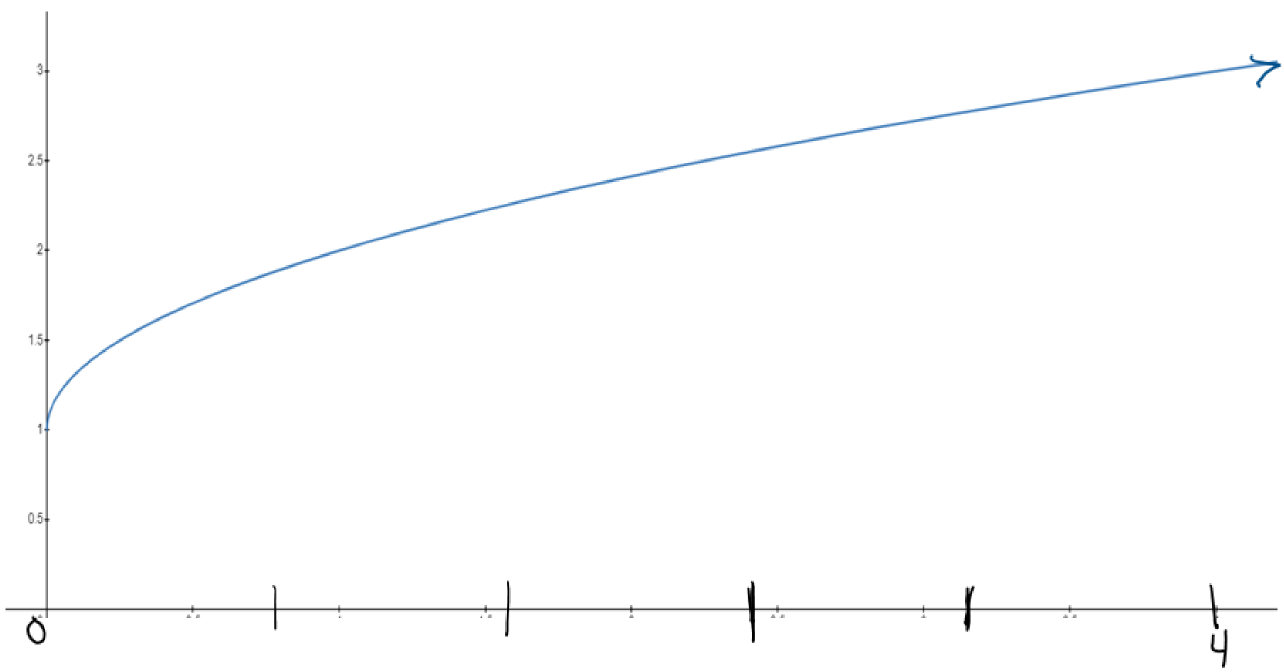
Let's use a different method to determine the height of the slices: MIDPOINT RULE

3 *approximating rectangles using MIDPOINTS*

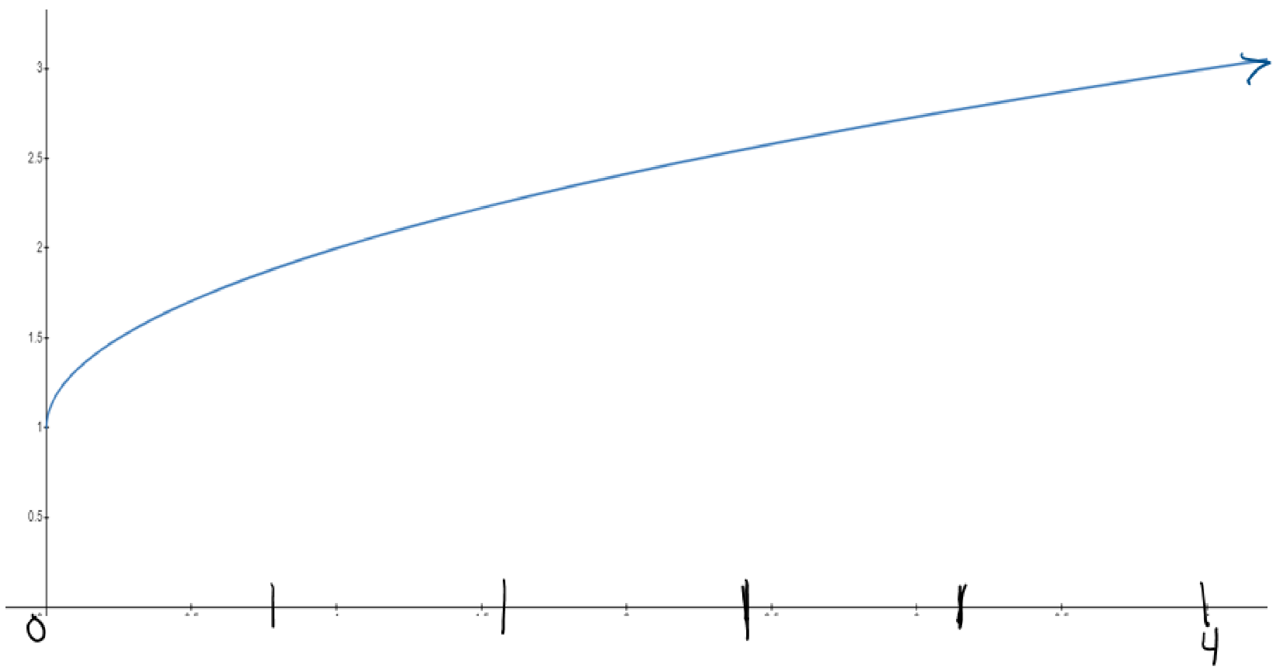
Given $f(x) = \sqrt{x} + 1$, SET UP L_5 between $x = 0$ and $x = 4$.



Given $f(x) = \sqrt{x} + 1$, SET UP M_5 between $x = 0$ and $x = 4$.



One more way to determine heights: TRAPEZOIDAL RULE



Sigma Notation

a condensed way of writing sums uses capital sigma: Σ

ex. Convert the sum $3+4+5+6+7$ into sigma notation.

ex. $\sum_{i=3}^{7}\frac{1}{i}=$

ex. $\sum_{i=1}^{4}2=$

ex. $\sum_{i=1}^{n}1=$

REVISIT setting up area estimate L_3 under $f(x)=x^2$ from $x=1$ to $x=4$ using *sigma notation*.

REVISIT: set up R_6 under $f(x) = \sin x$ from $x = 0$ to $x = \frac{3\pi}{2}$ using *sigma notation*.

Given $f(x) = \sqrt{x} + 1$, express R_5 between $x = 0$ and $x = 4$ using *sigma notation.*