LRAM, RRAM, and MRAM

**LEFT, RIGHT, or MIDPOINT Rectangle Approximation Methods** for finding the area between the function and the \( x \)-axis.

Each is a RIEMANN SUM. Break the interval into subintervals for each method.

LRAM uses the \( x \)-value on the LEFT side of each subinterval to determine the height of each rectangle.
RRAM uses the \( x \)-value on the RIGHT side of each subinterval to determine the height of each rectangle.
MRAM uses the \( x \)-value in the MIDDLE of each subinterval to determine the height of each rectangle.

In each case the **height of the rectangle is the function value** at the selected \( x \)-value.

TOTAL AREA is approximated by adding the areas of all the rectangles.
An example of LRAM with 8 subintervals.

Notice the height of each rectangle is determined by the LEFT endpoint for each subinterval.

**Extra Notes on LRAM and RRAM …

If a function is INCREASING, LRAM underestimates the actual area and RRAM overestimates the actual area.

If a function is DECREASING, LRAM overestimates the actual area and RRAM underestimates the actual area.