Riemann Sums and Error Stacks

Today we will be looking at another example of accumulation to get an estimate for the area of an arbitrary shape. We will also try to get a sense of "how good" our estimate is.

We will use *Riemann Sums* to approximate the area "under the curves" in the figures. We will use *Error Stacks* to bound the error of our approximation.

Riemann Sums and Error Stacks

- On the interval between $x = 4$ and $x = 13$, the function $f(x)$ is decreasing. $f(4) = 212$ and $f(13) = -8$. Find the size of Δx needed to ensure that any Riemann sum using that Δx is within 0.1 of the actual value. Then find the number of subintervals n needed.

- On the interval between $x = -3$ and $x = 17$, the function $f(x)$ is increasing. $f(-3) = 4$ and $f(17) = 7$. Find the size of Δx needed to ensure that any Riemann sum using that Δx is within 0.1 of the actual value. Then find the number of subintervals n needed.

- On the interval between $x = -4$ and $x = 4$, the function $f(x)$ is first increasing, then decreasing. It reaches its maximum at $x = 0$. $f(-4) = f(4) = -1$ and $f(0) = 10$. Find the size of Δx needed to ensure that any Riemann sum using that Δx is within 0.1 of the actual value. Then find the number of subintervals n needed.