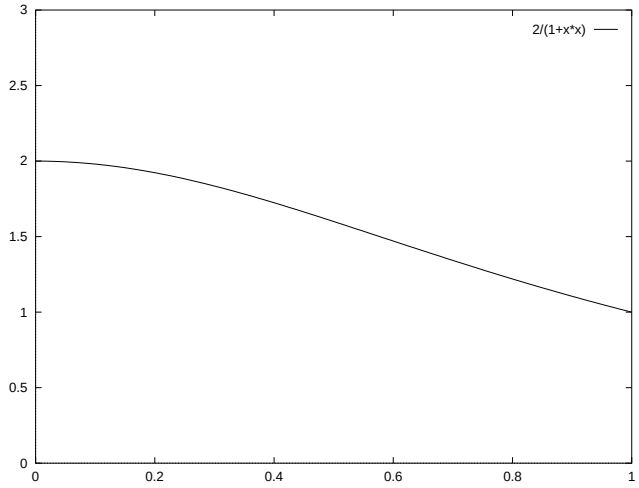
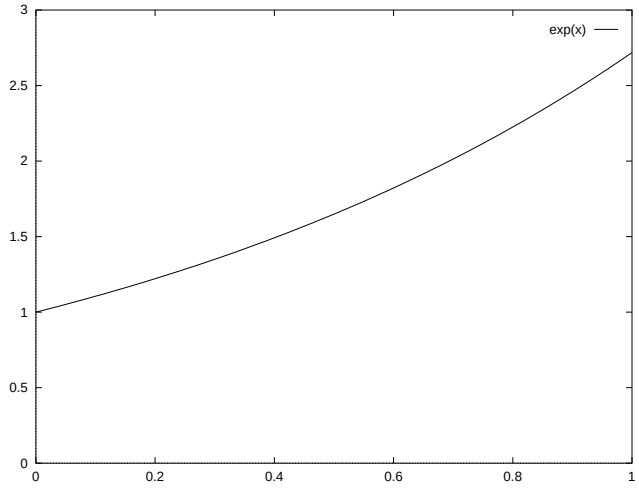
Errors in Riemann Sums
Class 4: Wednesday January 29

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

1. 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.

2. 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.

3. 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.