Worksheet 6
Trapezoid Rule and Simpson's Rule

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1. Finish the problem from class.

2. Consider

$$f : \mathbb{R} \longrightarrow \mathbb{R}$$

$f(x) = x^3$, $y = 0$, $x = 1$ to $x = 13$. Let $n = 12$.

A. Compute the trapezoid rule approximation for

$$\int_1^{13} x^3 dx$$

B. Compute the trapezoid rule error approximation for part A when we approximate $\int_1^{13} x^3 dx$.

C. Compute actual error when using the trapezoid rule approximation for part A to approximate $\int_1^{13} x^3 dx$.

3. Consider

$$f : \mathbb{R} \longrightarrow \mathbb{R}$$

$f(x) = x^3$, $y = 0$, $x = 1$ to $x = 13$. Let $n = 6$. Compute the Simpson's rule approximation for

$$\int_1^{13} x^3 dx$$

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4.[1] Consider

$$f : \mathbb{R} \longrightarrow \mathbb{R}$$

$f(x) = \dfrac{1}{\sqrt{x^2+1}}$, $y = 0$, $x = 1$ to $x = 3$. Let $n = 4$.

A. Compute the trapezoid rule approximation for the integral.

B. Compute the smallest number of 'cuts' (partitions or trapezoids – the n in the error formula) for an approximation using the trapezoid rule so that the error is less than 0.001.

[1] Do not do before we discuss this in class.