$$S = \sum_{k=1}^{\infty} a_k = \sum_{k=1}^{n} a_k + \sum_{k=n+1}^{\infty} a_k = S_n + R_n$$

$a_n = f(n)$

$$\int_n^{\infty} f(x)\,dx < R_n = \sum_{k=n+1}^{\infty} a_k = n\text{-tail} \geq \int_{n+1}^{\infty} f(x)\,dx$$

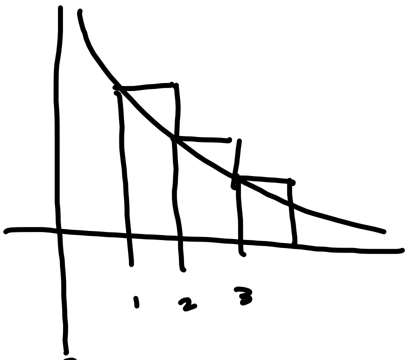
$= a_{n+1} + \dots$

How many terms to make $R_n < .0005$

for $S = \sum_{k=1}^{\infty} \frac{1}{n^5}$

Want $R_n < .0005$

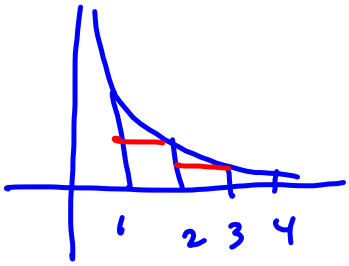
$$\int_{n+1}^{\infty} \frac{1}{x^5}\,dx < R_n < .0005$$



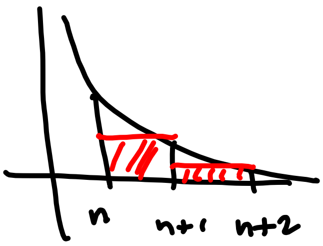
$$R_0 = \sum_{1}^{\infty} > \int_{1}^{\infty}$$

$$> R_n = \sum_{n+1}^{\infty} > \int_{n+1}^{\infty}$$

$\sum_{1}^{\infty} > \int_{1}^{\infty}$



$\sum_{2}^{\infty} < \int_{1}^{\infty}$



$R_n = a_{n+1} + \cdots < \int_{n}^{\infty}$

Fresh Start:

Section 11.3 #38

$$\sum_{k=1}^{\infty} \frac{1}{n^5}$$

Want $R_n < .0005$

Want something BIGGER than R_n that comes in UNDER .0005 & then

$$R_n < .0005$$

$$R_n < \int_n^{\infty} f(x)\,dx < .0005 \longrightarrow$$

$$R_n < .0005$$

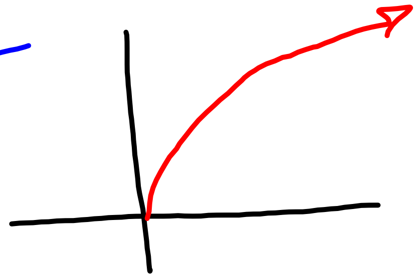
$$\int_n^{\infty} \frac{dx}{x^5} = \int_n^{\infty} x^{-5}\,dx$$

So $\displaystyle\int_n^{t} x^{-5}\,dx = -\frac{1}{4}x^{-4}\Big]_n^{t} = -\frac{1}{4}t^{-4} - \left(-\frac{1}{4}n^{-4}\right)$

$\underline{t \to \infty}$ $\quad \frac{1}{4}n^{-4} = \frac{1}{n^4} \overset{\text{want}}{<} .0005$

$$500 = \frac{1}{4(.0005)} < n^4$$

$$\frac{1}{\frac{5}{10000}} = \frac{10000}{5} = 2000$$



$$n^4 > 500$$

$$n > \sqrt[4]{500} \approx 4.73$$

So sum it out 5 terms.

$$R_n < \int_n^{\infty} < .0005$$

Coming soon...

$$(a+b)^n = \sum_{k=1}^{n} \binom{n}{k} a^{n-k} b^k$$

$$\binom{n}{k} = \frac{n!}{(n-k)!\,k!} \quad (\quad ,$$

$$= \frac{n\cdot(n-1)\cdots(n-k+2)(n-k+1)\cancel{(n-k)(n-(k+1))}\cdots}{\cancel{(n-k)(n-(k-1))\cdots(3)(2)(1)}\big(k(k-1)(k-2)\cdots(3)(2)(1)\big)}$$

$$3! = 3\cdot2\cdot1$$

$$10! = 10\cdot9\cdot8\cdot7\cdot6\cdot5\cdot4\cdot3\cdot2\cdot1$$

$$0! = 1$$

= Binomial Coefficient:

$$\frac{n\cdot(n-1)(n-2)\cdots(n-k+1)}{k!}$$

$$(1+x)^{\frac{3}{4}} \qquad n = \tfrac{3}{4}\,?!$$