

Pg. 730 31, 33, 35, 37

31.) $\sum_{n=1}^{\infty} \frac{1}{n^2}$

a.) $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots + \frac{1}{10^2}$

$1 + 0.25 + 0.11 + 0.0625 + 0.04 + 0.02777 + 0.02041 + 0.01563 + 0.01235 + 0.01$
 ≈ 1.549

$\int_{10}^{\infty} \frac{1}{n^2}$

$= -n^{-1} \Big|_{10}^{\infty}$

$= -\frac{1}{\infty} - \left(-\frac{1}{10}\right)$

$= 0.1$

error ≤ 1

$-n^{-1}$
 n^{-2}

b.) $S_n + \int_{n+1}^{\infty} f(x) dx \leq S \leq S_n + \int_n^{\infty} f(x) dx$

$1.549 + \int_{11}^{\infty} -n^{-1} \leq S \leq 1.549 + \int_n^{\infty} -n^{-1}$

$1.549 + \frac{1}{11} \leq S \leq 1.549 + 0.1$

$1.639 \leq S \leq 1.649$

$1.6445 \leq 0.005$

c.) $\frac{1}{n} \leq 0.001$

$1 = 0.001$

$n = 1000$

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10/10/10

+

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$$31) \sum_{n=1}^{\infty} \frac{1}{n^2}$$

$$1 + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} + \frac{1}{36} + \frac{1}{49} + \frac{1}{64} + \frac{1}{81} + \frac{1}{100}$$

$$S_{10} = 1.5498$$

$$\int_{10}^{\infty} \frac{1}{x^2} = \int_{10}^{\infty} x^{-2} = -x^{-1} \Big|_{10}^{\infty} = \frac{-1}{x} \Big|_{10}^{\infty} = \frac{1}{10}$$

error 0.1

$$S_n + \int_{n+1}^{\infty} \frac{1}{x^2} dx \leq S \leq S_n + \int_{10}^{\infty} \frac{1}{x^2} dx$$

$$1.5498 + \frac{1}{11} \leq S \leq 1.5498 + \frac{1}{10}$$

$$1.6407 \leq S \leq 1.6498$$

$$\frac{1.6407 + 1.6498}{2} = S$$

$$1.64525 = S$$

$$1.6498 - 1.64525$$

$$\frac{1}{n^2} = 0.00455$$

0.005 error

$$\frac{1}{11^2}$$

$$\frac{1}{11^2}$$



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100

31. a) $\sum_{n=1}^{10} \frac{1}{n^2} = 1.55$, $\sum_{n=1}^{\infty} \frac{1}{n^2} = S$

b) $1.55 + \int_{10}^{\infty} \frac{1}{x^2} dx \leq S \leq 1.55 + \int_{10}^{\infty} \frac{1}{x^2} dx$

$1.55 + \left[\frac{-1}{x} \right]_{10}^{\infty} \leq S \leq 1.55 + \left[\frac{-1}{x} \right]_{10}^{\infty}$

$1.55 + \frac{1}{10} \leq S \leq 1.55 + \frac{1}{10}$

$1.6407 \leq S \leq 1.6498$

a) $\frac{1}{10} \leq R_{10} \leq \frac{1}{10}$
 ≤ 0.1

b) $R_{10} \leq 0.001$

$\int_{10}^{\infty} \frac{1}{x^2} dx \leq 0.001$

$\frac{1}{10} \leq 0.001$

$n \geq 1000$

FIVE STAR.
 ★★★★★

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 ★★★★★

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