Math 152

Assigned October 27, 2004
Due November 3, 2004

Workshop and homework

	11.3:	21,28
Homework:	11.4:	1,2,9,17,37
	11.5:	3,7,15,31

1 Under the hypotheses of the integral test, if $a_n = f(n)$ then for any positive integer N,

$$\sum_{N+1}^{\infty} a_n \leq \int_N^{\infty} f(x)\,dx,$$

assuming that the integral converges.

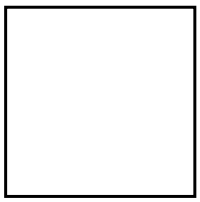
(a) How large does N have to be to ensure that

(1) $\displaystyle\sum_{n=1}^{N} \frac{1}{n^5}$ is within 10^{-6} of $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^5}$?

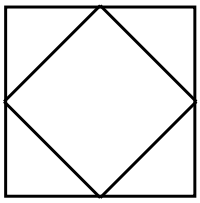
(2) $\displaystyle\sum_{n=1}^{N} ne^{-n^2}$ is within 10^{-6} of $\displaystyle\sum_{n=1}^{\infty} ne^{-n^2}$?

(b) Get a decimal approximation for the sum of one of the series, with a maximum allowed error of 10^{-6}.

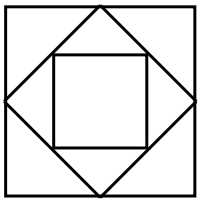
2 Suppose that you draw a 1" by 1" square:



And then you join the midpoints of its sides to make another square:



And then you join the midpoints of that new square to form another square:



(a) Will you need infinitely many pencils to continue this process indefinitely?

(b) If an infinite sequence of these squares is drawn, what is the sum of the perimeters of all the squares?