How Quickly Things Go to 0 as n goes to ∞

Math 112

Use this to help sharpen your intuition for the last problem on the Basic Skills Exam.

If $(a_n)_{n=1}^{\infty}$ and $(b_n)_{n=1}^{\infty}$ are sequences with $\lim_{n\to\infty} a_n = \lim_{n\to\infty} b_n = 0$, we can say that $(a_n)_{n=1}^{\infty}$ goes to zero faster than $(b_n)_{n=1}^{\infty}$ if $\lim_{n\to\infty} \dfrac{a_n}{b_n} = 0$.

a_n

Faster

$1/n^n$
$1/n!$
$2^n/n!$
$3^n/n!$
$1/3^n$
$1/2^n$
$n/2^n$
$n^2/2^n$
$1/n^3$
$1/n^2$
$1/n^{3/2}$

} Fast enough for $\sum a_n$ to converge

$1/n$
$1/\sqrt{n}$
$1/\ln n$

Slower

Question: Where does $\dfrac{n!}{n^n}$ fit into this?