

SOME THINGS TO CONSIDER WHEN DECIDING WHICH CONVERGENCE TEST TO RUN

CATEGORY 1: You should recognize when to use these tests on sight:

p-series
geometric
root

CATEGORY 2: You should always consider this test before the Category 3 tests:

divergence (in some cases, may be easier to run ratio test first)

CATEGORY 3: These are the remaining tests:

ratio	
limit comparison (▼)(●)	alternating series
(direct) comparison (▼)	absolute convergence (▼)
telescoping	
integral	

(▼) requires the creation of another series,
on which you will need to start the convergence testing process over again
(●) if you can achieve an inequality of the desired format ($0 < a_n \leq b_n$) by simply deleting
terms or factors without changing coefficients, a (direct) comparison test will be less work

Looking back at your homework, if you see the following expressions inside the summation, and none of the Category 1 or 2 tests apply, which Category 3 tests are more likely to be productive ? (Some will have multiple tests.)

n^k (where k is a constant)

b^n (where b is a positive constant)

b^n (where b is a negative constant)

$\ln n$

$\sin n$

$\cos n$

$\cos n\pi$

$\arcsin n$

$\arccos n$

$\arctan n$

$n!$

n^n

sum/difference of the above (ie. which term is most important in your choice ?)

product of the above (ie. which factor is most important in your choice ?)

The choices you make above will also usually apply if you replace n with a linear (and sometimes polynomial) function in n .

When doing (direct) comparisons, what upper and lower bounds should you try for the following functions ?

Some bounds will be constants, some bounds will be functions.

Remember $n \geq 1$.

if $b > 1$,	$\underline{\hspace{1cm}}$	$\leq$	b^{-n}	$\leq$	$\underline{\hspace{1cm}}$				
	$\underline{\hspace{1cm}}$	$\leq$	$\ln n$	$\leq$	$\underline{\hspace{1cm}}$				
	$\underline{\hspace{1cm}}$	$\leq$	$\sin f(n)$	$\leq$	$\underline{\hspace{1cm}}$	and	$\underline{\hspace{1cm}}$	$\leq$	$ \sin f(n) \leq \underline{\hspace{1cm}}$
	$\underline{\hspace{1cm}}$	$\leq$	$\cos f(n)$	$\leq$	$\underline{\hspace{1cm}}$	and	$\underline{\hspace{1cm}}$	$\leq$	$ \cos f(n) \leq \underline{\hspace{1cm}}$
if $-1 \leq f(n) \leq 1$,	$\underline{\hspace{1cm}}$	$\leq$	$\arcsin f(n)$	$\leq$	$\underline{\hspace{1cm}}$	and	$\underline{\hspace{1cm}}$	$\leq$	$ \arcsin f(n) \leq \underline{\hspace{1cm}}$
if $-1 \leq f(n) \leq 1$,	$\underline{\hspace{1cm}}$	$\leq$	$\arccos f(n)$	$\leq$	$\underline{\hspace{1cm}}$	and	$\underline{\hspace{1cm}}$	$\leq$	$ \arccos f(n) \leq \underline{\hspace{1cm}}$
	$\underline{\hspace{1cm}}$	$\leq$	$\arctan f(n)$	$\leq$	$\underline{\hspace{1cm}}$	and	$\underline{\hspace{1cm}}$	$\leq$	$ \arctan f(n) \leq \underline{\hspace{1cm}}$