

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 $b > 1$,	<u> </u> \leq	b^{-n}	\leq <u> </u>			
	<u> </u> \leq	$\ln n$	\leq <u> </u>			
	<u> </u> \leq	$\sin f(n)$	\leq <u> </u>	and	<u> </u> \leq	$ \sin f(n) $ \leq <u> </u>
	<u> </u> \leq	$\cos f(n)$	\leq <u> </u>	and	<u> </u> \leq	$ \cos f(n) $ \leq <u> </u>
if $-1 \leq f(n) \leq 1$,	<u> </u> \leq	$\arcsin f(n)$	\leq <u> </u>	and	<u> </u> \leq	$ \arcsin f(n) $ \leq <u> </u>
if $-1 \leq f(n) \leq 1$,	<u> </u> \leq	$\arccos f(n)$	\leq <u> </u>	and	<u> </u> \leq	$ \arccos f(n) $ \leq <u> </u>
	<u> </u> \leq	$\arctan f(n)$	\leq <u> </u>	and	<u> </u> \leq	$ \arctan f(n) $ \leq <u> </u>