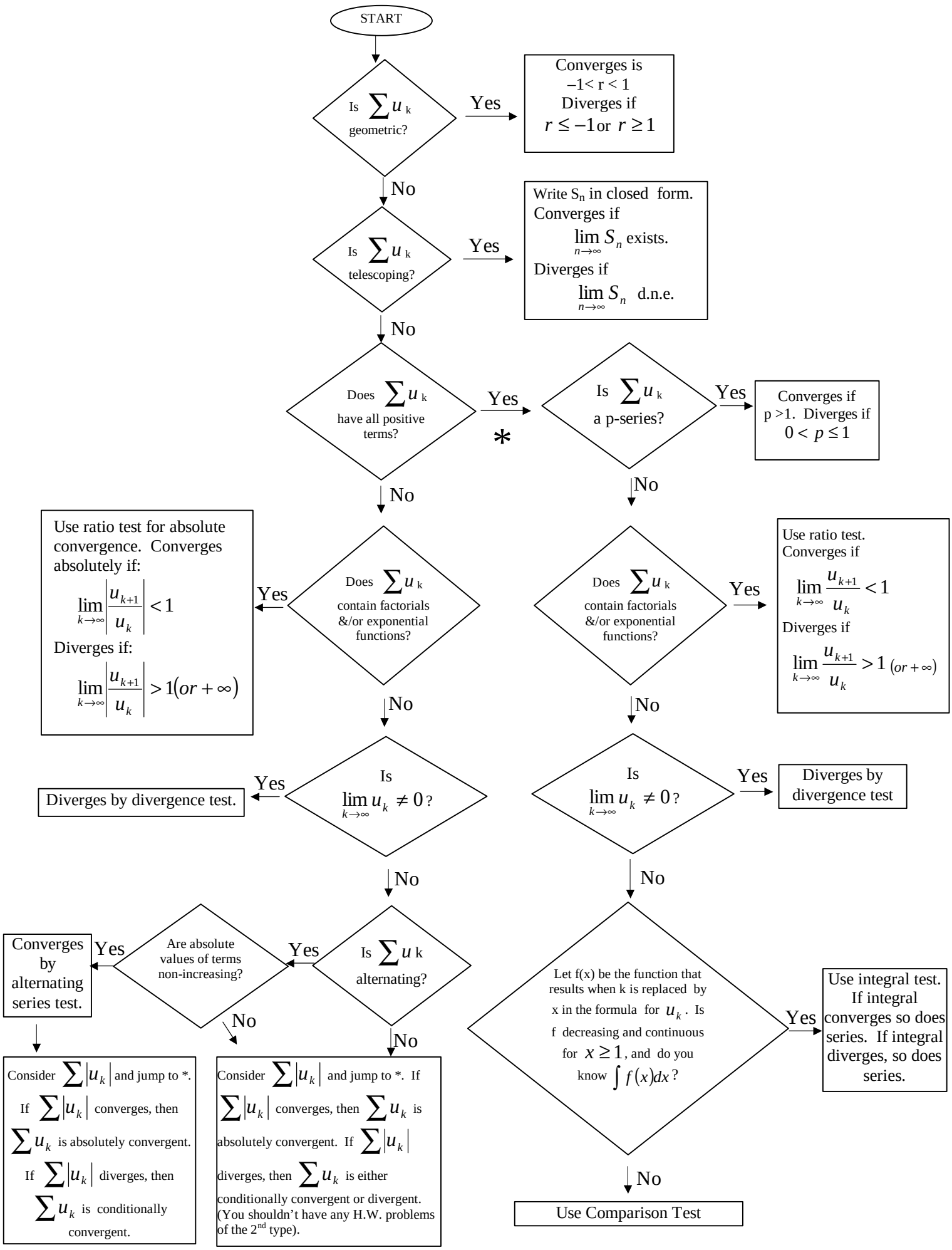
START
Is $\sum u_k$ geometric?
Yes
Converges is $-1 < r < 1$ Diverges if $r \le -1$ or $r \ge 1$
No
Is $\sum u_k$ telescoping?
Yes
Write S_n in closed form. Converges if $\lim_{n\to\infty} S_n$ exists. Diverges if $\lim_{n\to\infty} S_n$ d.n.e.
No
Does $\sum u_k$ have all positive terms?
Yes
*
Is $\sum u_k$ a p-series?
Yes
Converges if p >1. Diverges if $0 < p \le 1$
No
No
Does $\sum u_k$ contain factorials &/or exponential functions?
Yes
Use ratio test for absolute convergence. Converges absolutely if: $\lim_{k\to\infty}\left|\frac{u_{k+1}}{u_k}\right| < 1$ Diverges if: $\lim_{k\to\infty}\left|\frac{u_{k+1}}{u_k}\right| > 1 (or +\infty)$
No
Does $\sum u_k$ contain factorials &/or exponential functions?
Yes
Use ratio test. Converges if $\lim_{k\to\infty}\frac{u_{k+1}}{u_k} < 1$ Diverges if $\lim_{k\to\infty}\frac{u_{k+1}}{u_k} > 1 \ (or +\infty)$
No
Is $\lim_{k\to\infty} u_k \ne 0$?
Yes
Diverges by divergence test.
No
Is $\lim_{k\to\infty} u_k \ne 0$?
Yes
Diverges by divergence test
No
Is $\sum u_k$ alternating?
Yes
Are absolute values of terms non-increasing?
Yes
Converges by alternating series test.
No
Consider $\sum |u_k|$ and jump to *. If $\sum |u_k|$ converges, then $\sum u_k$ is absolutely convergent. If $\sum |u_k|$ diverges, then $\sum u_k$ is conditionally convergent.
No
Consider $\sum |u_k|$ and jump to *. If $\sum |u_k|$ converges, then $\sum u_k$ is absolutely convergent. If $\sum |u_k|$ diverges, then $\sum u_k$ is either conditionally convergent or divergent. (You shouldn't have any H.W. problems of the 2nd type).
No
Let f(x) be the function that results when k is replaced by x in the formula for u_k. Is f decreasing and continuous for $x \ge 1$, and do you know $\int f(x)dx$?
Yes
Use integral test. If integral converges so does series. If integral diverges, so does series.
No
Use Comparison Test