| Notecards Sequences | | |
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| 1 | What are the 4 ways to solve $\lim_{n\to\infty} f(x)$ | 1- Break up using Algebra<br>2- $LH\hat{o}pitals$ Rule<br>3- Rules for Horizontal Asymptotes<br>(Compare the Degree in the top to the degree in the bottom)<br>4- Multiply Fraction (top and bottom)<br>By $\frac{1}{highest\ power}$ |
| 2 | Divergence Test<br>$\sum_{n=1}^{\infty} a_n$ | Diverges: **If** $\lim_{n\to\infty} a_n =$ Anything but zero<br>Inconclusive: **If** $\lim_{n\to\infty} a_n = 0$<br><br>*If you get inconclusive…. That is not an answer!!!! You must try another test!* |
| 3 | Geometric Series<br>$\sum_{n=1}^{\infty} ar^{n-1}$ | Converges: **If** $\lvert r\rvert < 1$<br>Diverges: **If** $\lvert r\rvert \geq 1$ |
| 4 | $P$ –Series<br>$\sum_{n=1}^{\infty} \frac{1}{n^p}$ | Converges: **If** $p > 1$ **Then** $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges<br>Diverges: **If** $p \leq 1$ **Then** $\sum_{n=1}^{\infty} \frac{1}{n^p}$ diverges |
| 5 | Telescoping Series<br>$\sum_{n=1}^{\infty} (a_n - a_{n+1})$ | Converges: **If** $\lim_{n\to\infty} a_n = L$<br>Diverges: **If** $\lim_{n\to\infty} a_n = \pm\infty$ |
| 6 | Integral Test<br>$\sum_{n=1}^{\infty} a_n$ | Let $a_n$ be a positive, decreasing, and continuous function<br><br>Converges: **If** $\int_1^{\infty} a_n$ converges **then** $\sum_{n=1}^{\infty} a_n$ converges<br>Diverges: **If** $\int_1^{\infty} a_n$ diverges **then** $\sum_{n=1}^{\infty} a_n$ diverges |
| 7 | Alternating Series<br>$\sum_{n=1}^{\infty} (-1)^{n-1} a_n$ | If $a_n$ is positive and decreasing<br>Converges: **If** $\lim_{n\to\infty} a_n = 0$<br>Diverges: **If** $\lim_{n\to\infty} a_n = anything\ but\ 0$ |
| 8 | Ratio Test<br>$\sum_{n=1}^{\infty} a_n$ | Convergent: **If** $\lim_{n\to\infty} \left\lvert\frac{a_{n+1}}{a_n}\right\rvert < 1$<br>Diverges: **If** $\lim_{n\to\infty} \left\lvert\frac{a_{n+1}}{a_n}\right\rvert > 1$<br>Inconclusive: **If** $\lim_{n\to\infty} \left\lvert\frac{a_{n+1}}{a_n}\right\rvert = 1$<br>*If you get inconclusive…. That is not an answer!!!! You must try another test!* |

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| 9 | Root Test $$\sum_{n=1}^{\infty} a_n$$ | Converges: **If** $\lim_{n\to\infty} \sqrt{\|a_n\|} < 1$<br>Diverges: **If** $\lim_{n\to\infty} \sqrt{\|a_n\|} > 1$<br>Inconclusive: **If** $\lim_{n\to\infty} \sqrt{\|a_n\|} = 1$<br><br>*If you get inconclusive…. That is not an answer!!!! You must try another test!* |
| 10 | Comparison Test $$\sum_{n=1}^{\infty} a_n$$ Or $$\sum_{n=1}^{\infty} b_n$$ | Converges: **If** $b_n > a_n$ **and** $b_n$ converges<br>**Then** $a_n$ converges<br><br>Diverges: **If** $a_n < b_n$ **and** $a_n$ diverges<br>**Then** $b_n$ diverges |
| 11 | Limit Comparison Test $$\sum_{n=1}^{\infty} a_n$$ | If $b_n$= function when you compare the degree in the top to the degree in the bottom.<br><br>Converges: **If** $\lim_{n\to\infty} \frac{a_n}{b_n} = exists$ **and** $b_n$ converges<br>Diverges: **If** $\lim_{n\to\infty} \frac{a_n}{b_n} = exists$ **and** $b_n$ diverges |