

## Table Review:

1)  $\lim_{n \rightarrow \infty} \frac{n^2 - 1}{n^2 + n} = 1$  div  $n^{\text{th}}$  term/integral

2)  $\left(\frac{3}{5}\right)^k + \left(\frac{4}{5}\right)^k$  conv geo

3)  $\frac{1}{n^2 + n} = \frac{A}{n} + \frac{B}{n+1}$   $\frac{1}{n} - \frac{1}{n+1}$   
 $n(n+1)$   
 $1 = A(n+1) + B(n)$   
 $n = -1: 1 = B(-1) \quad B = -1$   
 $n = 0: 1 = 1A \quad A = 1$   
 $\left(\frac{1}{1} - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{3}\right) + \left(\frac{1}{3} - \frac{1}{4}\right)$   
 $= 1$  Conv  
 telescopic/  
 DCT

4)  $\frac{1}{n \ln n}$   $\int_2^{\infty} \frac{1}{x \ln x} dx$   $u = \ln x$   
 $du = \frac{1}{x} dx$

$\int \frac{1}{u} du \rightarrow \lim_{b \rightarrow \infty} \ln(\ln x) \Big|_2^b = \ln(\ln b) - \ln(\ln 2) = \infty$   
 div integral

5)  $\left(\frac{e}{\pi}\right)^{k-1} = \left(\frac{e}{\pi}\right)^k \cdot \frac{\pi}{e}$  conv geo

6)  $\frac{1}{e^{1/k}}$   $\lim_{k \rightarrow \infty} \frac{1}{e^{1/k}} = 1$   $n^{\text{th}}$  term div

7)  $\frac{3^n}{\sqrt{2}}$   $\lim_{n \rightarrow \infty} \frac{3^n}{\sqrt{2}} = \infty$   $n^{\text{th}}$  term div  
 $\frac{1}{\sqrt{2}} (3)^n$  geo

8)  $\frac{2}{k^{4/5}}$  div p-series

9)  $3n^{-3.2} = \frac{3}{n^{3.2}}$  conv p-series

10)  $\left(\frac{1}{\ln 2}\right)^{k-1} \left(\frac{1}{\ln 2}\right)^k \cdot \ln 2$  div geo

$\ln e = 1$   
 $\ln 2 < 1$

11)  $\frac{1}{\ln n} \rightarrow \text{div}$   $\frac{1}{n}$  small div

12)  $\frac{1}{\sqrt{n} + 3^n} \rightarrow \text{conv}$   $\frac{1}{3^n} = \left(\frac{1}{3}\right)^n$  big con

13)  $\lim_{n \rightarrow \infty} \frac{1}{2n+1} \cdot \frac{2n}{1} = 1 \rightarrow \text{div}$   $\frac{1}{2n}$  div

14)  $\frac{3}{n}$  div  $\lim_{n \rightarrow \infty} \frac{3}{\sqrt{n^2-4}} \cdot \frac{n}{3} = 1$  div

15)  $\frac{1}{4n^3}$  conv  $\lim_{n \rightarrow \infty} \frac{n^2-10}{4n^5+n^3} \cdot \frac{4n^3}{1} = 1$  conv