MATHEMATICS 201-203-RE
Integral Calculus
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Strategy for Testing Series

State the test used to determine the convergence of the following series.

a) $\sum_{n=1}^{\infty} \frac{n-1}{n^2+n}$ LCT with $b_n = \frac{1}{n}$ Diverges

b) $\sum_{n=1}^{\infty} \frac{3n-2\sqrt[3]{n}}{\sqrt[7]{n^2+5}}$ LCT with $b_n = n^{\frac{5}{7}}$ Diverges

c) $\sum_{n=1}^{\infty} (-1)^n \frac{2n}{n^2+1}$ AST Converges

d) $\sum_{n=1}^{\infty} \frac{2^n}{n^2+1}$ Ratio Test Diverges

e) $\sum_{n=1}^{\infty} \frac{\operatorname{arccot}(n)}{n^2+1}$ IT or CT with $b_n = \frac{\pi}{n^2}$ Converges

f) $\sum_{n=1}^{\infty} \left(\sqrt[n]{2}-1\right)^n$ Root Test Converges

g) $\sum_{n=1}^{\infty} \cos n$ DT Diverges

h) $\sum_{n=2}^{\infty} \frac{\sin n}{n^5}$ Converges absolutely using CT with $b_n = \frac{1}{n^5}$ Converges

i) $\sum_{n=1}^{\infty} \frac{2(-3)^{2n+3}}{4^{n-1}5^{1-3n}}$ Geometric Series Diverges

j) $\sum_{n=1}^{\infty} \frac{2^n}{(2n+1)!}$ Ratio Test Converges

k) $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}+1}$ AST Converges

l) $\sum_{n=1}^{\infty} \frac{4^n}{n+8^n}$ Ratio Test Converges

m) $\sum_{n=1}^{\infty} \frac{(-2)^{2n}}{n^n}$ Ratio Test Converges

n) $\sum_{n=1}^{\infty} \frac{n^2+1}{n^3-3}$ LCT with $b_n = \frac{1}{n}$ Diverges

o) $\displaystyle\sum_{n=2}^{\infty}\frac{\sqrt{n^3+1}}{\sqrt[4]{n^3-1}}$ LCT with $b_n = n^{\frac{3}{4}}$ Diverges

p) $\displaystyle\sum_{n=2}^{\infty}\ln n$ DT Diverges

q) $\displaystyle\sum_{n=0}^{\infty}\frac{n!}{2\cdot 5\cdot 8\cdot\cdots\cdot(3n+2)}$ Ratio Test Converges

r) $\displaystyle\sum_{n=1}^{\infty}\frac{e^{\frac{1}{n}}}{n^2}$ IT Converges

s) $\displaystyle\sum_{k=1}^{\infty}\frac{1}{\sqrt{k(k+2)}}$ LCT with $b_n = \frac{1}{n}$ Diverges

t) $\displaystyle\sum_{n=1}^{\infty}\frac{(-1)^n n}{2^n (2n)!}$ Ratio Test Converges

u) $\displaystyle\sum_{n=1}^{\infty}\frac{\ln n}{n^2}$ IT Converges

v) $\displaystyle\sum_{n=0}^{\infty}\left(\frac{2n}{5+6n}\right)^n$ Root Test Converges

w) $\displaystyle\sum_{n=1}^{\infty}\frac{n+3}{3^n}$ Ratio Test Converges

x) $\displaystyle\sum_{n=1}^{\infty}\frac{n}{e^n}$ Ratio Test or IT Converges

y) $\displaystyle\sum_{n=1}^{\infty}(-1)^n\frac{\sqrt{n}}{\sqrt{n}+1}$ DT Diverges