#1. Calculate the limit of the following sequences. **Do and show rigorous work.**

(a-1)(5pt)

$$a_n = \frac{n^3 + 10n + 3}{7 + 2n^3}$$

10pt) Test the convergence of the following series

$$\sum_{n=1}^{\infty} \frac{2^n}{3^{n-1}}.$$

If converges, calculate the series **Do and show rigorous work.**

Test the convergence of

$$\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}.$$

Do and show rigorous work.

Test the convergence of

$$\sum_{n=1}^{\infty} \frac{n}{n^3 + 2n + 3}.$$

Do and show rigorous work.

April 22, 2019

#3.(a) Test the convergence of

$$\sum_{n=1}^{\infty} \frac{(-1)^n 3^n}{n!}.$$

Do and show rigorous work.

Test the convergence of

$$\sum_{n=1}^{\infty} \left(\frac{2n}{n+3}\right)^n.$$

Do and show rigorous work.

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Find the radius of convergence and the interval of convergence of

$$\sum_{n=0}^{\infty} \frac{(x-1)^n}{n!}.$$

Do and show rigorous work.

(b) Find the radius of convergence and the interval of convergence of

$$\sum_{n=0}^{\infty} \frac{nx^n}{2^n}.$$

Do and show rigorous work.

22, 2019

a-1)(4pt) Using the following Taylor series

$$\frac{1}{1+x} = 1-x+x^2-x^3+x^4-...,$$

Calculate the Taylor Series of ln(x+1) at 0

(a-2)(6pt) Estimate ln(1.25) using the dgree 3 Taylor polynomial of $\ln(1+x)$ at 0. **Do and show rigorous work.**

You may use pre-calculate values:

$\frac{1}{2} = 0.5, \frac{1}{4} = 0.25, \frac{1}{8} = 0.125,$

$\frac{1}{16} = 0.062, \frac{1}{32} = 0.031, \frac{1}{192} = 0.005$

(b)(10pt) **By using the definition,** calculate the Taylor series generated by

$$f(x) = e^{2x+1} \; at \; x = 0.$$

Either use the sigma notation with the general term or show at least 5 nonzero terms followed by dots (ellipsis). **Do and show rigorous work.**