$$\lim_{x\to\pi/2} \left[\frac{\ldots}{1-0} \right]$$

$$= \lim_{x\to\pi/2} \left[\frac{2x(-\sin^2 x + \cos^2 x)}{1} \right]$$

$$= 2\cdot\pi/2 \left[-\sin^2(\pi/2) + \cos^2(\pi/2)\right]$$

$$= \pi(-1+0)$$

$$= \pi(-1)$$

$$= -\pi$$

$$\therefore \lim_{x\to\pi/2} \left[\frac{(x^2-\pi/4)(\sin\cos x)}{x-\pi/2} \right]$$

$$= -\pi$$

ib) $$\lim_{x\to\pi/2} \ln \left[\exp \frac{(3x^2+2x-1)}{x+1} \right]$$

$$\lim_{x\to\pi/2} \left[\frac{(3x-1)(x+1)}{(x+1)} \right]$$

$$= \lim_{x\to\pi/2} (3x-1)$$

$$= 3(\pi/2) - 1$$

$$= \pi/\ldots\ 1$$

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$$= \cos\left[\sin^{-1} \frac{\sqrt{3}}{2}\right]$$

$$= \cos 60 \quad = \tfrac{1}{2} \text{ or } 0.5$$

d) $$\lim_{x \to 4} \left[\frac{x^2 - 8x + 16}{x^2 - 5x + 4}\right]$$

$$= \lim_{x \to 4} \left[\frac{x^2 - 4x - 4x + 16}{x^2 - 4x - x + 4}\right]$$

$$U_{n+1} \quad \frac{2}{(n+2)\times(n+3)}$$

$$\lim_{n\to 0} \frac{U_{n+1}}{Un} = \frac{2}{(n+2)(n+3)} \times \frac{(n+3)(n+2)}{2}$$

$$\lim_{n\to\infty} \frac{U_{n+1}}{U_n} = \frac{n^2+3n+2}{n^2+5n+6}$$

Divide through by highest OFn as $n\to\infty$, $3n/n^2 \to 0$, $2/n^2 \to 0$ $5/n^2 \to 0$, $6/n^2 \to 0$

$$\lim_{n\to\infty} = \frac{1 + 3n/n^2 + 2/n^2}{n^2/n^2 + 5/n^2 + 6/n^2}$$

$$\frac{1+0+0}{1+0+0} = 1$$, from the rule it my Converge or diverge.

From test 1 $\lim_{n\to\infty} U_n = \lim_{n\to\infty} \frac{2}{(n^2+3n+2)} = \frac{2/n^2}{n^2/n^2 + 3/n^2 + 2/n^2}$

$0/1 = 0$ The Series is convergent

∴ The Series is Convergent.

2b) $\frac{2}{1^2} + \frac{2}{2^2} + \frac{2}{3^2} + \frac{2}{4^2} + \ldots$

$$U_n = \frac{2}{n^2}, \quad U_{n+1} \frac{2}{(n+1)^2}$$

$$\lim_{n\to\infty} \frac{U_{n+1}}{U_n} = \frac{n^2+2n+1}{n^2}$$

$$\frac{U_{n+1}}{U_n} = \frac{n^2/n^2 + 2n/n^2 + 1/n^2}{n^2/n^2}$$ as $n\to\infty$, $2n/n^2 \to 0$, $1/n^2 \to 0$,

$$1+0+0 = 1$$

from Test 1 $\lim_{n \to \infty} u_n = \lim_{n \to \infty} \frac{2}{n^2}$

2(c.) $u_n = \frac{1+2n^2}{1+n^2}$

$\lim_{n\to\infty} u_n = \frac{1/n^2 + 2n^2/n^2}{1/n^2 + n^2/n^2}$

$= \frac{0+2}{0+1} = \frac{2}{1}$

$= 2$ ∴ The series is divergent

3.) $x + x^3 \ldots + x^n$

$(2n+3)^3$

$$= \frac{(8n^3+12n^2+6n+1)x}{8n^3+18n^2+54n+27}$$

$$= \frac{8xn^3+12xn^2+6xn+x}{8n^3+18n^2+54n+27}$$

divide by highest power of n.

$$= \frac{\frac{8xn^3}{n^3}+\frac{12xn^2}{n^3}+\frac{6xn}{n^3}+\frac{x}{n^3}}{8n^3/n^3+18n^2/n^3+54n/n^3+27/n^3}$$

$$\lim_{x \to 0} \frac{\cos 0 + \sin 0}{3 \cos^2} = \frac{1+0}{0} \text{ undefine}$$

$$\lim_{x \to 0} \frac{-\sin x + \cos x}{6x} = \frac{-\sin 0 + \cos 0}{6(0)} = \frac{-0+1}{0}$$

undefin

$$\lim = -\cos x - \sin x = \underline{-\cos 0 - \sin 0} = \underline{-1-0}$$