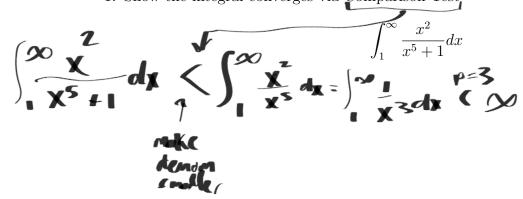
MATH 242 - HW7

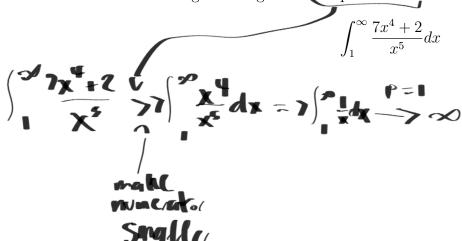
due: 03/06/2024

١

1. Show the integral converges via Comparison Test



2. Show the integral diverges via Comparison Test



3. Evaluate the Improper Integral

$$\frac{2}{(x-2)(x+2)} = \frac{A}{x-2} + \frac{B}{x+2}$$

$$2 = A(x+2) + B(x-2)$$

$$1 \neq x=2$$

$$3 = 4A \Rightarrow 4 \Rightarrow 5$$

if
$$x=2$$

$$z = 4A \Rightarrow A=\frac{1}{2}$$

$$\frac{1}{2} = 4A \Rightarrow A$$

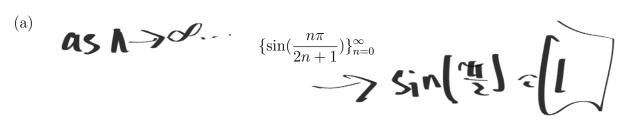
 $\int_{0}^{\infty} \frac{2}{x^2 - 4} dx$

$$a = h(y) dv = ydy \qquad \int_0^1 y \ln(y) dy$$

$$du = \frac{1}{2} dy \qquad v = \frac{y^2}{2} \left(\frac{1}{2} \right) \left(\frac{1}{2} \right) \left(\frac{1}{2} \right) dy$$

 $=\frac{1}{2}\left(\int_{c}^{\infty}\frac{1}{x-z}-\frac{1}{x+z}\,dx\right)$

5. State whether each sequence diverges or converges, and to what it converges to in that case.



(b)
$$\{\sin(\frac{n\pi}{6})\}_{n=0}^{\infty}$$

(d)
$$\begin{cases} (-1)^n e^{-4n} \}_{n=0}^{\infty} < e^{-4n} \\ > 0 \end{cases}$$

$$\begin{cases} (1 - \frac{8}{n})^n \}_{n=1}^{\infty} = 1 \end{cases}$$

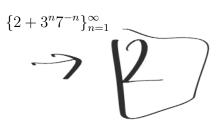
$$(1 - \frac{8}{n})^n \}_{n=1}^{\infty} = 1 \end{cases}$$

$$(1 - \frac{8}{n})^n \}_{n=1}^{\infty} = 1 \end{cases}$$

$$(1 - \frac{8}{n})^n \}_{n=1}^{\infty} = 1 \end{cases}$$

$$\begin{cases} (1 - \frac{8}{n})^n \}_{n=1}^{\infty} = 1$$

(e)



(f)

$$\left\{\frac{3n+2\sqrt{n}}{5n}\right\}_{n=1}^{\infty} \longrightarrow \frac{3}{5}$$

(g)

$$\{\cos(\frac{2+3n^3}{1+2n^2+4n^3})\}_{n=1}^{\infty} \subset \mathbb{C}$$