

THIS IS A NO CALCULATOR QUIZ

[10 POINTS]

Evaluate the following integrals. If an improper integral diverges, write "DIVERGES".

YOU MUST USE THE CORRECT NOTATION TO EVALUATE IMPROPER INTEGRALS (ie. no shortcuts).

$$\int_0^1 \frac{1}{\sqrt{1-x}} dx \quad \text{DISCONT @ } x=1$$

$$= \lim_{N \rightarrow 1^-} \int_0^N \frac{1}{\sqrt{1-x}} dx$$

$$= \lim_{N \rightarrow 1^-} \left(-2(1-x)^{\frac{1}{2}} \right) \Big|_0^N$$

$$= \lim_{N \rightarrow 1^-} (-2(1-N)^{\frac{1}{2}} + 2)$$

$$= 0 + 2 = 2$$

$$\int_0^1 \frac{1}{1+x} dx \quad \text{CONTINUOUS ON } [0,1]$$

$$= \ln|1+x| \Big|_0^1$$

$$= \ln 2 - \ln 1$$

$$= \ln 2$$

$$\int_{-2}^2 \frac{2}{x^2-1} dx \quad \text{DISCONT @ } x=\pm 1$$

$$= \int_{-2}^{-1} \frac{2}{x^2-1} dx + \int_{-1}^0 \frac{2}{x^2-1} dx + \int_0^1 \frac{2}{x^2-1} dx + \int_1^2 \frac{2}{x^2-1} dx$$

$$= \lim_{N \rightarrow -1^-} \int_{-2}^N \left(\frac{1}{x-1} - \frac{1}{x+1} \right) dx + \dots$$

$$= \lim_{N \rightarrow -1^-} \left(\ln|x-1| - \ln|x+1| \right) \Big|_{-2}^N + \dots$$

$$= \lim_{N \rightarrow -1^-} \left(\ln|N-1| - \ln|N+1| - \ln|-3| + \ln|-1| \right) + \dots$$

$\rightarrow \ln 2$ $\rightarrow -\infty$ $= \ln 3$ $= 0$
 DNE $\rightarrow$ DIVERGES

YOU MUST IDENTIFY WHICH PART OF LIMIT DOES NOT EXIST