

CH.10: REVIEW10.1/10.2 LIMITS

Review Limit forms
Trig, Inv trig graphs

L'Hôpital's Rule if $\frac{0}{0}, \pm\frac{\infty}{\infty}$ (Write ^{indet.} forms!)

$$\lim \frac{f}{g} = \lim \frac{f'}{g'} \text{ unless DNE}$$

Simplify or Repeat (if you can!)

$0 \cdot \infty$

$$\lim f \cdot g = \lim \frac{f}{1/g} \text{ or } \lim \frac{g}{1/f}$$

Use L'H

$0^0, \infty^0, 1^\infty$ (Indet. forms w/Exponent $\Rightarrow$ Use $\ln$)

$\lim f(x)$ (Write indet. forms!)

- ① $y = f(x)$
- ② $\ln y = \ln \quad$ (Use Power/Smackdown Rule: $\ln M^P$)
- ③ Find $\lim \ln y$ (= "L" if exists)
- ④ $\lim y = \lim e^{\ln y}$
 $= e^L$

Ideas $e^\infty = \infty$
 $e^{-\infty} = 0$

$\infty - \infty$

Get 1 fraction

10.3/10.4 IMPROPER $\int$

$$\int = \text{a real \#}$$

$$\Leftrightarrow \int \text{converges (else diverges)}$$

$$\textcircled{\text{I}} \quad \underbrace{\int_a^\infty f(x) dx}_{\text{cont. on } [a, \infty)} = \lim_{t \rightarrow \infty} \underbrace{\int_a^t}_{\text{Maybe find } \int \text{ 1st, Apply FTC later}}$$

$$\underbrace{\int_{-\infty}^b f(x) dx}_{\text{cont. on } (-\infty, b]} = \lim_{t \rightarrow -\infty} \int_t^b$$

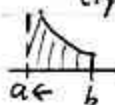
$$\underbrace{\int_{-\infty}^\infty f(x) dx}_{\text{cont. e-where}} = \underbrace{\int_{-\infty}^c}_{\text{converges}} + \underbrace{\int_c^\infty}_{\text{converges}}$$

$\leftarrow \begin{array}{c} | \\ c \\ \text{cut} \end{array} \rightarrow$

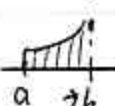
$$\text{converges} \Leftrightarrow \text{both converge}$$

Comparison Tests

$$\textcircled{\text{II}} \quad \underbrace{\int_a^b f(x) dx}_{\text{explodes in } [a, b]}$$



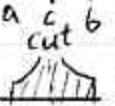
$$\int_a^b = \lim_{t \rightarrow a^+} \int_t^b$$



$$\int_a^b = \lim_{t \rightarrow b^-} \int_a^t$$



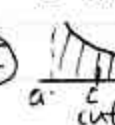
$$\int_a^b = \int_a^c + \int_c^b$$



$$\int_a^b = \int_a^c + \int_c^b$$

$\downarrow \text{conv.} \Leftrightarrow \text{both conv.}$

cut at discont.

$$\textcircled{\text{I+II}} \quad \int_a^\infty = \int_a^c + \int_c^\infty$$


POP QUIZ II