

$$\text{Find } \lim_{x \rightarrow \infty} x \cdot \frac{(\sqrt{x^2-2} - \sqrt{x^2+1}) \cdot (\sqrt{x^2-2} + \sqrt{x^2+1})}{(\sqrt{x^2-2} + \sqrt{x^2+1})}$$

$$= \lim_{x \rightarrow \infty} \frac{x(x^2-2 - (x^2+1))}{\sqrt{x^2-2} + \sqrt{x^2+1}} = \frac{-3x}{\lim_{x \rightarrow \infty} \sqrt{x^2-2} + \sqrt{x^2+1}}$$

Divide num's  
denom by  
 $x$  or  $\sqrt{x^2}$

$$= \lim_{x \rightarrow \infty} \frac{-3x/x}{\sqrt{\frac{x^2-2}{x^2}} + \sqrt{\frac{x^2+1}{x^2}}}$$

$x$  is positive

$$= \lim_{x \rightarrow \infty} \frac{-3}{\sqrt{1 - \frac{2}{x^2}} + \sqrt{1 + \frac{1}{x^2}}}$$

$$= \frac{-3}{\sqrt{1} + \sqrt{1}} = \frac{-3}{2}$$

Remove the limit notation here, because we have evaluated the fractions as  $x \rightarrow \infty$