6. $\lim_{x\to\infty} \frac{x}{\sqrt{x^2-2}}$

$= \lim_{x\to\infty} \frac{\frac{x}{x}}{\frac{1}{x}\sqrt{x^2-2}}$

$= \lim_{x\to\infty} \frac{1}{\sqrt{\frac{x^2}{x^2}-\frac{2}{x^2}}}$

$= \lim_{x\to\infty} \frac{1}{\sqrt{1-\frac{2}{x^2}}}$

$= \frac{1}{\sqrt{1-\frac{2}{\infty^2}}}$

$= \frac{1}{\sqrt{1-0}}$

$= \boxed{1}$

$\sqrt{\frac{x^2-2}{x^2}}$

$\sqrt{\frac{x^2-2}{x\cdot x}}$

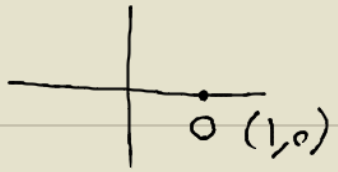
$\frac{1}{x}\sqrt{x^2-2}$

7. $\lim_{x\to\infty} \sin\frac{1}{x}$

$= \sin\frac{1}{\infty}$

$= \sin 0$

$= \boxed{0}$



8. $\lim_{x\to-\infty} (3+2e^x)$

$= 3+2e^{-\infty}$

$= 3+\frac{2}{e^{\infty}}$

$= 3+0$

$= \boxed{3}$

9. $\lim_{x\to\infty} \left(\frac{1}{2}+\ln\left(\frac{x^2-3}{x^2}\right)\right)$

$= \lim_{x\to\infty} \left(\frac{1}{2}+\ln\left(\frac{\frac{x^2}{x^2}-\frac{3}{x^2}}{\frac{x^2}{x^2}}\right)\right)$

$= \lim_{x\to\infty} \left(\frac{1}{2}+\ln\left(\frac{1-\frac{3}{x^2}}{1}\right)\right)$

$= \lim_{x\to\infty} \left(\frac{1}{2}+\ln\left(1-\frac{3}{x^2}\right)\right)$

$= \frac{1}{2}+\ln\left(1-\frac{3}{\infty^2}\right)$

$= \frac{1}{2}+\ln(1-0)$

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

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

$= \boxed{\frac{1}{2}}$