Calculus Worksheet: Limits of Functions (3)

Find the following limits

1. $\lim_{x\to\infty} \frac{3\sin x}{x}$

$-3 \le 3\sin x \le 3$

divide all terms of the inequality by x.

$-\frac{3}{x} \le \frac{3\sin x}{x} \le \frac{3}{x}$ Use Squeezing theorem.

$\lim_{x\to+\infty} \frac{3\sin x}{x} = 0.$

2. $\lim_{x\to 0} \frac{\cos x - 1}{\tan x} = \frac{0}{0}$

Apply l'hopital theorem.

$= \lim_{x\to 0} \frac{\sin x}{\sec^2 x} = \frac{0}{1} = 0.$

3. $\lim_{x\to 0} \frac{\sin(5x)}{\sin(2x)} = \frac{0}{0}$ indeterminate form.

Apply l'hopital theorem

$= \lim_{x\to 0} \frac{5\cos(5x)}{2\cos(2x)} = \frac{5}{2}.$