Special Trig Limits

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The Squeeze Theorem: If $h(x) \le f(x) \le g(x)$ for all x in an open interval containing c, except possibly at c itself, and if then $\lim_{x \to c} (h(x)) = L = \lim_{x \to c} (g(x))$, then $\lim_{x \to c} (f(x))$ exists and = L.

Special Trig Limits

1. $\lim_{x \to 0} \frac{\sin(x)}{x} = 1$

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

Find the limits:

1. $\lim_{x \to 0} \frac{\sin(5x)}{2x}$ $\left(\frac{5}{5}\right) = \lim \frac{5 \sin 5x}{2 \cdot 5x} = \frac{5}{2}$

**2. $\lim_{\theta \to \pi} (\theta \sec(\theta)) = \lim_{\theta \to \pi} \frac{\theta}{\cos\theta}$

$= \frac{\pi}{\cos\pi} = -\pi$

**3. $\lim_{\theta \to 0} \frac{1 - \cos(\theta)}{2\sin^2(\theta)}$ $= \lim_{\theta \to 0} \frac{1 - \cos\theta}{2(1 - \cos^2\theta)} = \lim_{\theta \to 0} \frac{1 - \cos\theta}{2(1 - \cos\theta)(1 + \cos\theta)}$

$= \lim_{\theta \to 0} \frac{1}{2(1 + \cos\theta)} = \frac{1}{2(1+1)} = \frac{1}{4}$