Panther ID: _____ **NAME:** _____

MAC 2311: Worksheet Sep. 8, 2016

1. Compute each of the following limits (Hint: use substitution technique and trigonometric identities.)

(*a*) $\lim\limits_{x\to 0} \dfrac{\sin(5x)}{x} =$

(*b*) $\lim\limits_{x\to 0} \dfrac{\sin(ax)}{x} =$

(*c*) $\lim\limits_{x\to 0} \dfrac{\tan(4x)}{x} =$

(*d*) $\lim\limits_{x\to 0} \dfrac{\tan(bx)}{x} =$

(*e*) $\lim\limits_{x\to 0} \dfrac{1-\cos(3x)}{x^2} =$

(*f*) $\lim\limits_{x\to 0} \dfrac{\tan^2(3x)}{x\sin(5x)} =$

(*g*) $\lim\limits_{x\to +\infty} x\tan\left(\dfrac{3}{x}\right) =$

2. Use the Squeeze theorem to prove that $\lim_{x\to+\infty} \frac{\sin(x)}{x} = 0$.

3. (a) Find the limit $\lim_{x\to+\infty} x \sin \frac{1}{x}$.

(b) Suppose that $f(x) = x \sin \frac{1}{x}$ for $x \neq 0$ and $f(0) = 0$. Determine if f is continuous at $x = 0$.