MATH 205 – Calculus I **SQ 4.7**

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Instructions: Though calculators can be used for all the questions, all problems require you to show your work. Any answer without proper justification will receive ***ZERO*** credit. Only **EXACT** answers will receive full credit unless otherwise noted.

1. Determine $\lim_{x\to 0}\frac{1-\cos 3x}{8x^2}$

$\lim_{x\to 0}\frac{1-\cos 3x}{8x^2} \overset{\text{L'Hop}}{\Rightarrow} \lim_{x\to 0}\frac{3\sin 3x}{16x} \overset{\text{L'Hop}}{\Rightarrow} \lim_{x\to 0}\frac{9\cos 3x}{16} = \frac{9}{16}$

DS: 0% DS: 0%

$\lim_{x\to 0}\frac{1-\cos 3x}{8x^2} = \frac{9}{16}$

2. Determine $\lim_{x\to 0^+} x^{2x}$

DS: 0^0

let $y = x^{2x}$

$\ln y = 2x \ln x$

$\lim_{x\to 0^+}\frac{\ln x}{1/2x} \overset{\text{L'Hop}}{\Rightarrow} \lim_{x\to 0^+}\frac{1/x}{\frac{-2}{4x^2}} = \lim_{x\to 0^+}\frac{1/x}{\frac{-1}{2x^2}} = \lim_{x\to 0^+}\frac{-2x^3}{x} = \lim_{x\to 0^+} -2x = 0$

DS: 0%

$\ln y = 0$

$y = e^0$

$y = 1$

$\lim_{x\to 0^+} x^{2x} = 1$