Semester 2 Unit 5 – 5- 1 WKST Name:_____

Trigonometric Limits. No Graphing Calculator is allowed for these problems. Also, do not use L'Hôpital's Rule.

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Evaluate the limits algebraically.

1. $\lim_{x\to 0} \frac{\sin 3x}{x}$

2. $\lim_{x\to 0} \frac{3x}{\sin 5x}$

3. $\lim_{x\to 0} \frac{\sin(x^2)}{x}$

4. $\lim_{x\to 0} \frac{\sin x}{x^2}$

5. $\lim_{x\to 0} \frac{\sin^2 3x}{5x^2}$

6. $\lim_{x\to 0} \frac{2x}{\tan 3x}$

7. $\lim_{x\to 0} (x \csc x)$

8. $\lim_{x \to 0} \dfrac{x^2}{1 - \cos x}$

[ Hint: multiply the top and bottom by $(1 + \cos x)$ . ]

9. $\lim_{x \to 0} \dfrac{1 - \sec^2 2x}{x^2}$

10. $\lim_{x \to 0} \dfrac{2x^2 + x}{\sin x}$

11. $\lim_{x \to 0} \dfrac{\tan 3x}{2x^2 + 5x}$

12. $\lim_{x \to 0} \dfrac{\sin^2 x}{1 - \cos x}$

13. $\lim_{x \to 0} \dfrac{1}{2x \csc x}$

14. $\lim_{x \to \pi} \dfrac{\sin x}{x - \pi}$

[ Hint: Let $A = x - \pi$ and use
$\sin(a + b) = (\sin a)(\cos b) + (\cos a)(\sin b)$ ]

15. $\lim_{x \to \frac{\pi}{3}} \dfrac{\frac{1}{2} - \cos x}{x - \frac{\pi}{3}}$

[ Hint: $\cos(a + b) = (\cos a)(\cos b) - (\sin a)(\sin b)$ ]

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ANSWERS:

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|---|---|---|---|
| 1) 3 | 5) 9/5 | 9) -4 | 13) 1/2 |
| 2) 3/5 | 6) 2/3 | 10) 1 | 14) -1 |
| 3) 0 | 7) 1 | 11) 3/5 | 15) $\frac{\sqrt{3}}{2}$ |
| 4) DNE | 8) 2 | 12) 2 | |