Calculus Name______________________________Pd.______

Limits of Trig Functions Limits, Cont., & R.O.C Day 8

1. $\lim_{x\to 0} \frac{\sin x}{5x} = \frac{1}{5}$

2. $\lim_{x\to 0} \frac{3(1-\cos x)}{x} = 0$

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

4. $\lim_{x\to \frac{\pi}{2}^-} \tan x = \infty$

5. $\lim_{x\to \pi} \cos 3x = -1$

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6. $\lim_{\theta\to 0} \frac{\sec\theta - 1}{\theta\sec\theta} = 0$

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

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8. $\lim_{\theta\to \infty} \cos 2\theta = \text{DNE}$

\# video

9. $\lim_{x\to 0} \cos \frac{1}{x} = \text{DNE}$

10. $\lim_{x\to \infty} \sin x = \text{DNE}$

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11. $\lim_{x\to 0} \frac{\tan^2 x}{x} = 0$

12. $\lim_{x\to \pi} x\sec x = -\pi$

13. $\lim_{x\to \frac{\pi}{2}} \frac{\cos x}{\cot x} = 1$

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

Intermediate Value Theorem

14. Suppose $f(x)=x^3+5$.

a.) Show that $f(c)=13$ for some c on the interval $(-1,3)$. Find the value(s) of c.

$f(x)=x^3+5$ is continuous b/c it is a polynomial

$f(-1)=4$ $f(3)=32$

Since $4<13<32$, then by IVT there exists at least one c such that $f(c)=13$

Find the value: $c=\pm\sqrt{8}$

b.) Use IVT to verify that there is a root for $f(x)$ on the interval $(-2,1)$.

$f(-2)=-3$ $f(1)=6$

Since $-3<0<6$, then by IVT there exists at least one root on $(-2,1)$

Suppose the function h is continuous for all real numbers. Use the tale below to answer the following questions.

x	0	1	2	3	4	5
$h(x)$	−12	−8	−7	1	3	−2
$g(x)$				−3	3	

a.) Suppose $g(x)=3h(x)-6$. Show that there must be a value n for $3<n<4$ such that $g(n)=0$.

h(x) is continuous and

$g(3)<0<g(4)$

then by IVT there exists at least one value n such that $g(n)=0$

b.) What is the fewest number of x-values for which h must equal 0? Explain your reasoning.

2 values

$h(2)<0<h(3)$

$h(4)>0>(h(5))$