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OH: M 11-12pm / **ML:** Th 1-3pm

Name:

"A recall is worth a thousand repetitions"
Dr. Wayne Iba

Collaborators:

Section Day/Time:

Limits and Continuity

Limit Laws	
$\lim_{x\to a}[f(x)+g(x)] =$	$\lim_{x\to a}[f(g(x))] =$
	as long as
$\lim_{x\to a}[c\cdot g(x)] =$	
$\lim_{x\to a}[f(x)\cdot g(x)] =$	If $f(x)=g(x)$ for $x\neq a$, then, provided the limit exists,
$\lim_{x\to a}\left[\frac{f(x)}{g(x)}\right] =$	$\lim_{x\to a} f(x) =$
as long as	

1. Compute the following limits:

a) $\displaystyle\lim_{z\to 3}\left(z^2e^z+\frac{z}{2e^z}\right)$

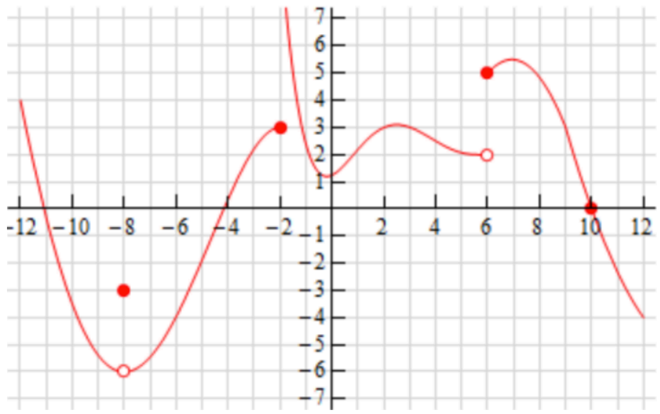
b) $\displaystyle\lim_{b\to 0}\frac{\cos(b)-\sin(b)}{b^2+1}$

c) $\displaystyle\lim_{x\to 1}\frac{x-1}{x^2-1}$

d) Suppose $\lim_{y\to 2} g(y)=3$ and $\lim_{y\to 4} g(y)=2$. Find $\displaystyle\lim_{y\to 2}[g(y^2)\cdot g(y)^2]$

e) $\displaystyle\lim_{a\to 1^-}\frac{\ln(a-0.5)}{1-a}$ *(Does* $\displaystyle\lim_{a\to 1}\frac{\ln(a-0.5)}{1-a}$ *exist? Discuss.)*

f) Use the Squeeze Theorem to determine $\lim_{x\to 0} x^4\sin(\pi/x)$.



2. Determine where $f(x)$, graphed above, is discontinuous. Classify each type of discontinuity, and calculate $\lim_{x\to -8} f(f(x))$.

Asymptotes

Let $a \neq \pm\infty$. A function f has a at $x = a$ if $\lim_{x\to a^{+/-}} f(x) = \pm\infty$.

Discuss: By looking at a function of the form $f(x) = \frac{g(x)}{h(x)}$ where $p(x)$ and $q(x)$ are polynomials, how do you think we can find where the vertical asymptotes are?

3. Find all vertical asymptotes, and sketch a possible graph for $f(x) = \dfrac{x^{2020} - 2019}{(x-5)(x+2)}$

4. Suppose a function g is continuous, and suppose that you know the following about g:

1. $g(-3) = -4$
2. $g(3) = \pi$
3. $g(5) < -2$

What is the least number of roots (zeros) that g must have? Where must they be located?