Pre-Calculus Honors
Day 3 Classwork - Finding Limits Algebraically

Name: Key

Solve each limit algebraically. Show all necessary work.

1. $\lim_{x\to 4}\frac{5x-20}{x-4}$

$= \lim_{x\to 4}\frac{5(x-4)}{(x-4)} = \boxed{5}$

2. $\lim_{x\to 1}\frac{x^2-1}{x-1}$

$= \lim_{x\to 1}\frac{(x+1)(x-1)}{(x-1)}$

$= 1+1 = 2$

3. $\lim_{x\to -3}\frac{x^2+5x+6}{x^2-x-12}$

$= \lim_{x\to -3}\frac{(x+2)(x+3)}{(x+3)(x-4)}$

$= \lim_{x\to -3}\frac{x+2}{x-4} = \frac{-3+2}{-3-4} = \boxed{\frac{1}{7}}$

4. $\lim_{x\to 1}\frac{x^2-1}{x^3-1}$

$= \lim_{x\to 1}\frac{(x+1)(x-1)}{(x-1)(x^2+x+1)}$

$= \frac{1+1}{1+1+1} = \boxed{\frac{2}{3}}$

5. $\lim_{x\to 1}\frac{x^8-1}{x-1}$ → $x-1=0$, $x=1$

1	1	0	0	0	0	0	0	−1
	↓ 1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1 | 0

$\lim_{x\to 1} x^7+x^6+x^5+x^4+x^3+x^2+x+1$

$= 1+1+1+1+1+1+1+1 = \boxed{8}$

6. $\lim_{x\to 2}\frac{x-2}{x^4-16}$

$= \lim_{x\to 2}\frac{(x-2)}{(x^2+4)(x+2)(x-2)}$

$= \frac{1}{(8)(4)} = \boxed{\frac{1}{32}}$

7. $\lim_{x\to 7}\frac{x^3-4x^2-16x-35}{x-7}$ → $x-7=0$, $x=7$

7	1	−4	−16	−35
	↓	7	21	35
	$1x^2$	$+3x$	$+5$	| 0

$\lim_{x\to 7}\frac{(x-7)(x^2+3x+5)}{(x-7)}$

$= 7^2+3(7)+5 = 49+21+5 = \boxed{75}$

8. $\lim_{x\to -5}\frac{6x^3+29x^2-6x-5}{3x^2+8x-35}$

−5	6	29	−6	−5
	↓	−30	5	5
	$6x^2$	$-1x$	-1	| 0

−5	3	8	−35
	↓	−15	35
	$3x$	-7	| 0

$\lim_{x\to -5}\frac{(6x^2-x-1)(x+5)}{(3x-7)(x+5)}$

$= \frac{6(-5)^2-(-5)-1}{3(-5)-7} = \boxed{-7}$

Pre-Calculus Honors
Finding Limits Algebraically – Day 3 Homework

Name: _____

Solve the following limits **algebraically**. Show all necessary work!

1. $\lim_{x\to 5}\frac{x^2-2x-15}{x^2-4x-5}$

$= \lim_{x\to 5}\frac{(x-5)(x+3)}{(x-5)(x+1)}$

$= \frac{5+3}{5+1}$

$= \frac{8}{6} = \boxed{\frac{4}{3}}$

2. $\lim_{x\to 1}\frac{4x^4-5x^2+1}{x^2+2x-3}$

1 | 4 0 −5 0 1
↓ 4 4 −1 −1
4 4 −1 −1 | 0

$\lim_{x\to 1}\frac{(x-1)(4x^3+4x^2-x-1)}{(x-1)(x+3)}$

$= \frac{4+4-1-1}{4} = \frac{6}{4} = \boxed{\frac{3}{2}}$

3. $\lim_{t\to -2}\frac{t^3+8}{t+2}$

$= \lim_{t\to -2}\frac{(t+2)(t^2-2t+4)}{(t+2)}$

$= (-2)^2 - 2(-2) + 4$

$= 4 + 4 + 4$

$= \boxed{12}$

4. $\lim_{x\to 2}\frac{x^3+x^2-4x-4}{x^2+x-6}$

2 | 1 1 −4 −4
↓ 2 6 4
1 3 2 | 0

$\lim_{x\to 2}\frac{(x-2)(x^2+3x+2)}{(x-2)(x+3)}$

$= \frac{4+6+2}{5} = \boxed{\frac{12}{5}}$

5. $\lim_{x\to -1}\frac{x^5+1}{x+1}$

−1 | 1 0 0 0 0 1
↓ −1 1 −1 1 −1
1 −1 1 −1 1 | 0

$\lim_{x\to -1}\frac{(x+1)(x^4-x^3+x^2-x+1)}{(x+1)}$

$= 1+1+1+1+1 = \boxed{5}$

6. $\lim_{w\to 3}\frac{w^2-3w}{w^3-5w^2+3w+9}$

3 | 1 −5 3 9
↓ 3 −6 −9
1 −2 −3 | 0

$\lim_{w\to 3}\frac{w(w-3)}{(w-3)(w^2-2w-3)}$

$= \frac{3}{9-6-3} = \frac{3}{0} = \boxed{\text{und.}}$