I cannot help it - in spite of myself, infinity torments me. - Alfred de Musset

TO INFINITY AND BEYOND !!!!!

Important theorem: $\lim_{x\to\infty}\frac{1}{x}=0$

Limits Involving Infinity (Principle of Dominance)
1. $\lim_{x\to\infty}\frac{x^a}{x^b}$, *if* $a<b$. Then, limit = 0. (Look for the highest degrees/powers of x)
2. $\lim_{x\to\infty}\frac{Cx^a}{Dx^b}$, *if* $a=b$. Then, limit = $\frac{C}{D}$. (Look for the highest degrees/powers of x)
3. $\lim_{x\to\infty}\frac{x^a}{x^b}$, *if* $a>b$. Then, limit = ∞ or $-\infty$. (Look for the highest degrees/powers of x and check the sign of ∞ by substituting with a large x–value.)

Problems:

1. $\lim_{x\to\infty} 7+\frac{1}{3x}-\frac{2}{x^2}$	2. $\lim_{x\to-\infty}\frac{4x+8}{5x}$	3. $\lim_{x\to\infty}\frac{3x-1000}{x+100}$	4. $\lim_{x\to-\infty}\frac{5x+5}{7x^2+1}$
5. $\lim_{x\to\infty}\frac{5x^2+2}{4x^2+7}$	6. $\lim_{x\to-\infty}\frac{3x^3+5}{5x^2+1}$	7. $\lim_{x\to\infty}\frac{2x^2-4x}{x+1}$	8. $\lim_{x\to-\infty}\frac{2x^2-4x}{x+1}$
9. $\lim_{x\to\infty}\frac{3x^3+2}{5x^2-1}$	10. $\lim_{x\to-\infty}\frac{3x^2+2}{4x^2-1}$	11. $\lim_{x\to\infty}\frac{x^2+2}{x-555}$	12. $\lim_{x\to-\infty}\frac{3-2x}{3x^3-1}$
13. $\lim_{x\to\infty}\frac{3-5x}{3x-1}$	14. $\lim_{x\to\infty}\frac{3-2x^2}{3x-1}$	15. $\lim_{x\to\infty}\frac{6x^2-2x-1}{2x^2+3x+2}$	16. $\lim_{x\to\infty}\frac{3x^3+2}{2x^2-9x^3+7}$
17. $\lim_{x\to-\infty}\frac{x}{x^2-1}$	18. $\lim_{x\to-\infty}\frac{8x^2+3x}{2x^2-1}$	19. $\lim_{x\to\infty} 10-\frac{2}{x^2}$	20. $\lim_{x\to-\infty} 4+\frac{3}{x}$
21. $\lim_{x\to-\infty}\frac{5x^2}{x+3}$	22. $\lim_{x\to\infty}\frac{1}{2}x-\frac{4}{x^2}$	23. $\lim_{x\to\infty}\frac{\sin x}{x}$	24. $\lim_{x\to\infty}\frac{\cos 2x}{3x}$

Answers:

1) 7	2) $\frac{4}{5}$	3) 3	4) 0	5) $\frac{5}{4}$	6) $-\infty$
7) ∞	8) $-\infty$	9) ∞	10) $\frac{3}{4}$	11) ∞	12) 0
13) $-\frac{5}{3}$	14) $-\infty$	15) 3	16) $\frac{-1}{3}$	17) 0	18) 4
19) 10	20) 4	21) $-\infty$	22) ∞	23. 0	24. 0