SATPREP

Assignment : Limits involving approaching infinity: $\lim\limits_{x \to \infty} f(x)$

Important theorem: $\lim\limits_{x \to \infty} \dfrac{1}{x} = 0$

1. $\lim\limits_{x \to \infty} \dfrac{x^a}{x^b}$, *if* $a < b$. Then, limit = 0. (Look for the highest degrees/powers of x)
2. $\lim\limits_{x \to \infty} \dfrac{Cx^a}{Dx^b}$, *if* $a = b$. Then, limit = $\dfrac{C}{D}$. (Look for the highest degrees/powers of x)
3. $\lim\limits_{x \to \infty} \dfrac{x^a}{x^b}$, *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. $\lim\limits_{x \to \infty} 7 + \dfrac{1}{3x} - \dfrac{2}{x^2}$	2. $\lim\limits_{x \to -\infty} \dfrac{4x+8}{5x}$	3. $\lim\limits_{x \to \infty} \dfrac{3x-1000}{x+100}$	4. $\lim\limits_{x \to -\infty} \dfrac{5x+5}{7x^2+1}$
5. $\lim\limits_{x \to \infty} \dfrac{5x^2+2}{4x^2+7}$	6. $\lim\limits_{x \to -\infty} \dfrac{3x^3+5}{5x^2+1}$	7. $\lim\limits_{x \to \infty} \dfrac{2x^2-4x}{x+1}$	8. $\lim\limits_{x \to -\infty} \dfrac{2x^2-4x}{x+1}$
9. $\lim\limits_{x \to \infty} \dfrac{3x^3+2}{5x^2-1}$	10. $\lim\limits_{x \to -\infty} \dfrac{3x^2+2}{4x^2-1}$	11. $\lim\limits_{x \to \infty} \dfrac{x^2+2}{x-555}$	12. $\lim\limits_{x \to -\infty} \dfrac{3-2x}{3x^3-1}$
13. $\lim\limits_{x \to \infty} \dfrac{3-5x}{3x-1}$	14. $\lim\limits_{x \to \infty} \dfrac{3-2x^2}{3x-1}$	15. $\lim\limits_{x \to \infty} \dfrac{6x^2-2x-1}{2x^2+3x+2}$	16. $\lim\limits_{x \to \infty} \dfrac{3x^3+2}{2x^2-9x^3+7}$
17. $\lim\limits_{x \to -\infty} \dfrac{x}{x^2-1}$	18. $\lim\limits_{x \to -\infty} \dfrac{8x^2+3x}{2x^2-1}$	19. $\lim\limits_{x \to \infty} 10 - \dfrac{2}{x^2}$	20. $\lim\limits_{x \to -\infty} 4 + \dfrac{3}{x}$
21. $\lim\limits_{x \to -\infty} \dfrac{5x^2}{x+3}$	22. $\lim\limits_{x \to \infty} \dfrac{1}{2}x - \dfrac{4}{x^2}$	23. $\lim\limits_{x \to \infty} \dfrac{\sin x}{x}$	24. $\lim\limits_{x \to \infty} \dfrac{\cos 2x}{3x}$

Answers:

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