Calculus

1.6 Algebraic Manipulation (Limits)

Notes

Write your questions and thoughts here!

Direct Substitution		Factor and Cancel	
1. $\lim_{x\to -1}(x^2+2x-4)$	2. $\lim_{x\to 2} 6$	3. $\lim_{x\to 0}\frac{4x^2-5x}{x}$	4. $\lim_{x\to -7}\frac{2x^2+13x-7}{x+7}$

Limit Does Not Exist

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

Special Trig Limits:

$$\lim_{x\to 0}\frac{\sin x}{x}= \quad \text{or} \quad \lim_{x\to 0}\frac{x}{\sin x}=$$

$$\lim_{x\to 0}\frac{1-\cos x}{x}= \quad \text{or} \quad \lim_{x\to 0}\frac{\cos x-1}{x}=$$

6. $\lim_{x\to 0}\frac{\sin 3x}{x}$	7. $\lim_{x\to 0}\frac{\sin 7x}{\sin 9x}$	8. $\lim_{x\to 0}\frac{\cos^2 x-1}{x(\cos x+1)}$

1.6 Algebraic Manipulation of Limits

Calculus

Practice

Evaluate each limit.

1. $\lim_{x\to 2}(x-x^2)$	2. $\lim_{x\to 5}(x+1)^2$	3. $\lim_{x\to 1}\frac{x^2-5x}{x-1}$	4. $\lim_{x\to 1}\frac{x^2+x-30}{x-1}$
5. $\lim_{x\to 0}\frac{3x}{\sin x}$	6. $\lim_{x\to 0}\frac{\sin(2x)}{3x}$	7. $\lim_{x\to -2}(3x^2-x+1)$	8. $\lim_{x\to 3}(2x^2+5x-6)$
9. $\lim_{x\to -7}\frac{2x^3+11x^2-21x}{x^2+7x}$	10. $\lim_{x\to 8}\frac{x^2+2x-80}{x-8}$	11. $\lim_{x\to \frac{1}{3}}\frac{6x^2+13x-5}{3x-1}$	12. $\lim_{x\to 0}\frac{7x^2+x}{x}$
13. $\lim_{x\to -3}14$	14. $\lim_{x\to 0}\frac{x^2+2x-8}{x-4}$	15. $\lim_{x\to -2}\frac{x^2-4x-10}{x}$	16. $\lim_{x\to 0}\frac{3x^2+5x}{x}$

17. $\lim_{x\to 4}\frac{5x^2-21x+4}{x-4}$

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

19. $\lim_{x\to\pi}\cos x$

20. $\lim_{x\to\frac{\pi}{8}}\sin(4x)$

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

22. $\lim_{x\to 5}\frac{2x^2-17x+35}{5-x}$

23. $\lim_{x\to 0}\frac{(1-\cos^2 x)\sin x}{x^2}$

1.6 Algebraic Manipulation of Limits

Test Prep

24. Evaluate $\lim_{x\to 1}\frac{\ln x}{3x}$ is

(A) 0 (B) $\frac{3}{e}$ (C) e (D) 3 (E) The limit does not exist.

---

25. $\lim_{x\to 0} 4\frac{\sin x\cos x-\sin x}{x^2}$ is

(A) 2 (B) $\frac{40}{3}$ (C) ∞ (D) 0 (E) undefined

---

26. $\lim_{x\to a}\frac{x^2-2ax+a^2}{x-a} =$

(A) $-\infty$ (B) a (C) 0 (D) ∞ (E) The limit does not exist.

---

27. $\lim_{x\to 0}\left(\frac{3x^2+5\cos x-5}{2x}\right) =$

(A) 0 (B) $\frac{5}{2}$ (C) 3 (D) 4 (E) Does not exist