Key

**WS_Limits as $x \to \pm\infty$** **Calculus** **Appendix 7J**

**Find each limits if it exists. Show work if possible.**

1. $\lim_{n\to\infty}\left(\frac{1}{n^3}\right)$ 0

2. $\lim_{n\to\infty}\left(\frac{2n-n^2}{3n+5}\right)$ $-\frac{n}{3}$ $-\infty$

3. $\lim_{n\to\infty}\left(\frac{n^2+5}{n^3}\right)$

4. $\lim_{n\to\infty}\left(\frac{\sqrt{10n}+1}{\sqrt{2n}-4}\right)$ $\frac{\sqrt{10n}}{\sqrt{2n}} = \frac{\sqrt{10}}{\sqrt{2}}$ $\sqrt{5}$

5. $\lim_{n\to\infty}(-1)^{n+1}\left(\frac{1}{2n}\right)$ 0

6. $\lim_{n\to\infty}(-1)^{n+1}\left(\frac{3}{n^2+1}\right)$ 0

7. $\lim_{n\to\infty}(-1)^{n}\left(\frac{3^n}{n^2}\right)$ ← Faster DNE

8. $\lim_{n\to\infty}\left(\frac{1+5n}{2-3n}\right)$ $\frac{5n}{-3n}$ $-\frac{5}{3}$

9. $\lim_{n\to\infty}\left(\frac{3n^4-7n^2+2}{2n^4+1}\right)$ $\frac{3n^4}{2n^4}$ $\frac{3}{2}$

10. $\lim_{n\to\infty}\left(\frac{n^2}{n+1}\right)$ $\frac{n^2}{n} = n$ $\infty$

11. $\lim_{n\to\infty}\frac{\sqrt{n^2+4}}{n+4}$ $\frac{n}{n} = 1$ 1

12. $\lim_{n\to\infty}\frac{n!}{(n+2)!}$ $\frac{n!}{n!(n+1)(n+2)}$ $\frac{1}{n^2}$ 0

13. $\lim_{n\to\infty}\frac{3n+4}{\sqrt{2n^2}-5}$ $\frac{3n}{\sqrt{2}n} = \frac{3}{\sqrt{2}}$ or $\frac{3\sqrt{2}}{2}$

14. $\lim_{n\to\infty}\left(\frac{2}{n^2}-4n\right)$ $\lim_{n\to 0}\frac{2-4n^3}{n^2}$ $-4n$ $-\infty$

Without Graphing Evaluate Given:

$$g(x)=\begin{cases} 3x-2 & , x \le -1 \\ |x|-6 & , -1 < x \le 1 \\ 2x^2+3 & , x > 1 \end{cases}$$

15. $\lim_{x\to 1^+} g(x)$ $2(1)^2+3 = 5$

16. $\lim_{x\to 1^-} g(x)$ $|1|-6 = -5$

17. $\lim_{x\to 1} g(x)$ DNE

18. $\lim_{x\to 5} g(x)$ $2(5)^2+3 = 53$

19. $\lim_{x\to -1^+} g(x)$ $|-1|-6 = -5$

20. $\lim_{x\to -1^-} g(x)$ $3(-1)-2 = -5$

21. $\lim_{x\to -1} g(x)$ $-5$

22. $\lim_{x\to 0} g(x)$ $|0|-6 = -6$