

HL Math – Calculus Option
WORKSHEET ON L'HOPITAL'S RULE

Work the following on **notebook paper**.

On problems 1 – 3, find the limit by:

(a) using techniques from Chapter 1

(b) using L'Hopital's Rule.

1. $\lim_{x \rightarrow 3} \frac{2x-6}{x^2-9}$

2. $\lim_{x \rightarrow 3} \frac{\sqrt{x+1}-2}{x-3}$

3. $\lim_{x \rightarrow \infty} \frac{5x^2-3x+1}{3x^2-5}$

Evaluate by using L'Hopital's Rule, if possible.

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

13. $\lim_{x \rightarrow \infty} \frac{(\ln x)^3}{x}$

5. $\lim_{x \rightarrow 0} \frac{\sqrt{4-x^2}-2}{x}$

14. $\lim_{x \rightarrow 0^+} (-x \ln x)$

6. $\lim_{x \rightarrow 0} \frac{e^x-(1-x)}{x}$

15. $\lim_{x \rightarrow \infty} \left(x \sin \frac{1}{x} \right)$

7. $\lim_{x \rightarrow 0} \frac{\sin(2x)}{\sin(3x)}$

16. $\lim_{x \rightarrow \infty} x^{1/x}$

8. $\lim_{x \rightarrow 0} \frac{\arcsin x}{x}$

17. $\lim_{x \rightarrow 0^+} (1+x)^{1/x}$

9. $\lim_{x \rightarrow \infty} \frac{3x^2-2x+1}{2x^2+3}$

18. $\lim_{x \rightarrow 2^+} \left(\frac{8}{x^2-4} - \frac{x}{x-2} \right)$

10. $\lim_{x \rightarrow \infty} \frac{x^2+2x+1}{x-1}$

19. $\lim_{x \rightarrow 1^+} \left(\frac{3}{\ln x} - \frac{2}{x-1} \right)$

11. $\lim_{x \rightarrow \infty} \frac{x}{\sqrt{x^2+1}}$

20. $\lim_{x \rightarrow \infty} \frac{x^2}{e^{5x}}$

12. $\lim_{x \rightarrow \infty} \frac{\ln x}{x}$

21. $\lim_{x \rightarrow 0} \frac{e^{2x}-1}{e^x}$

22. $\lim_{x \rightarrow \frac{\pi}{2}^-} (\cos x)^{\cos x}$

23. $\lim_{x \rightarrow 0} \frac{\cos x - 1}{e^x - x - 1}$

Answers to Worksheet on L'Hopital's Rule

1. $\frac{1}{3}$

8. 1

15. 1

2. $\frac{1}{4}$

9. $\frac{3}{2}$

16. 1

3. $\frac{5}{3}$

10. ∞

17. e

4. DNE

11. 1 (L'Hop. doesn't work)

18. $-\frac{3}{2}$

5. 0

12. 0

19. ∞

6. 2

13. 0

20/ 0

7. $\frac{2}{3}$

14. 0

21. 0 (Not a L'Hop. problem)