

Name: \_\_\_\_\_

Period: \_\_\_\_\_

Date: \_\_\_\_\_

AP CALC BC

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Ms. Lombardi

### 5.6 Worksheet – L'Hôpital's Rule

On problems 1 – 3, find the limit by:

(a) using techniques from Chapter 1

(b) using L'Hôpital's Rule.

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

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

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

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

$$4. \lim_{x \rightarrow 0} \frac{x + \sin x}{x^3}$$

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

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

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

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

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

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

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

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

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

$$9. \lim_{x \rightarrow 0} \frac{x^3 - e^x}{2x^2}$$

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

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

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

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

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

$$12. \lim_{x \rightarrow \infty} \frac{4 + \cos x}{x^2}$$

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

**Answers to Worksheet on L'Hopital's Rule**

- |                  |                               |                              |
|------------------|-------------------------------|------------------------------|
| 1. $\frac{1}{3}$ | 8. 1                          | 15. 1                        |
| 2. $\frac{1}{4}$ | 9. DNE (Not a L'Hop. problem) | 16. 1                        |
| 3. $\frac{5}{3}$ | 10. $\infty$                  | 17. $e$                      |
| 4. DNE           | 11. 1 (L'Hop. doesn't work)   | 18. $-\frac{3}{2}$           |
| 5. 0             | 12. 0 (Not a L'Hop problem)   | 19. $\infty$                 |
| 6. 2             | 13. 0                         | 20/ 0                        |
| 7. $\frac{2}{3}$ | 14. 0                         | 21. 0 (Not a L'Hop. problem) |