

The Math 151 syllabus contains the following:

Lecture 15: covers section 4.4, with topic, l'Hopital's Rule, and suggested problems: 4.4: 1, 2, 3, 7, 10, 15, 21, 22, 29, 36, 37, 38, 47, 53, 54, 68.

If you haven't seen this material before, please read section 4.4, look at the suggested problems and try some. Please let me know if you need help, and we will meet and work together on it. Certainly I will respond to e-mail, also.

Below are problems I selected from exams and review material from the last time I taught Math 151. Please

**Do 10 of these problems. Hand in your work on Monday, October 24.**

General instructions: Find the limit, which could be a specific real number\* or  $+\infty$  or  $-\infty$ . In each case, briefly indicate your reasoning, based on algebra, properties of functions, l'Hopital's rule, etc.

$$1. \lim_{x \rightarrow \infty} \frac{\ln(\ln(x))}{(\ln(x))^2}$$

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

$$3. \lim_{x \rightarrow 0} \frac{x - \sin x}{(e^x - 1)^2}$$

$$4. \lim_{x \rightarrow \infty} x^4 e^{-x}$$

$$5. \lim_{x \rightarrow 1^-} (\arcsin(x^2) - \arcsin(x))$$

$$6. \lim_{x \rightarrow 0^+} \sqrt{x} \ln x.$$

$$7. \lim_{x \rightarrow 0^+} x^{\sin x}.$$

$$8. \lim_{x \rightarrow \infty} \frac{(\ln x)^2}{x}.$$

$$9. \lim_{x \rightarrow \infty} \frac{3e^x + 4e^{-x}}{5e^x + 4e^{-x}}.$$

$$10. \lim_{x \rightarrow +\infty} \left( \frac{x^3}{x^2 - 1} - \frac{x^3}{x^2 + 1} \right)$$

$$11. \lim_{x \rightarrow 0} \frac{\tan 17x}{\sin 13x}$$

$$12. \lim_{x \rightarrow +\infty} \frac{\sqrt{4 + 5x^4}}{3 + 6x + 7x^2}$$

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\* Give exact answers when possible using well-known constants such as  $\pi$ ,  $e$ ,  $\ln 3$ ,  $\sqrt{2}$ , etc.