

Homework #5**Due Wednesday, September 15th** in Gradescope by 11:59 pm ET**Goal:** Exploring Limits using L'Hôpital's Rule, and solidify size arguments

Compute each of the following Limits. Simplify.

1. $\lim_{\theta \rightarrow \frac{\pi}{2}} \frac{1 - \sin \theta}{1 + \cos(2\theta)}$

2. $\lim_{x \rightarrow \infty} \frac{\ln x}{\sqrt{x}}$

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

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

5. $\lim_{x \rightarrow 0} \frac{\sinh x - x}{x^3}$

6. $\lim_{x \rightarrow 0} \frac{e^x - e^{-x} - 2x}{x - \sin x}$

7. $\lim_{x \rightarrow 0} \frac{\arcsin(3x)}{\arctan(4x)}$

8. $\lim_{x \rightarrow 0} \frac{x - \arcsin x}{\arctan(2x) - 2x}$

9. $\lim_{x \rightarrow 0} \frac{3xe^x - \arctan(3x)}{x + \ln(1 - x)}$

10. $\lim_{x \rightarrow 0} \frac{\arcsin x + x^2 - x}{\cosh x - \arctan(5x) - e^{-5x}}$

11. $\lim_{x \rightarrow \infty} x \sin\left(\frac{\pi}{x}\right)$

12. $\lim_{x \rightarrow \infty} x \ln\left(1 - \frac{1}{x}\right)$

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

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

15. $\lim_{x \rightarrow \infty} x^2 e^{-x}$

16. $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$

17. $\lim_{x \rightarrow 0} (1 + \ln(1 - 3x))^{\frac{1}{x}}$

18. $\lim_{x \rightarrow \infty} \left(1 - \arctan\left(\frac{7}{x^4}\right)\right)^{x^4}$

REGULAR OFFICE HOURS

Monday: 1:00–3:00 pm

9–10:30 pm TA Mia, SMUDD 207

Tuesday: 12:00–4:00 pm

6–7:30 pm TA Ian, SMUDD 207

7:30–9:00 pm TA Karime, SMUDD 207

Wednesday: 1:00–3:00 pm

6–7:30 pm TA Ian, SMUDD 207

7:30–9:00 pm TA Daksha, SMUDD 207

Thursday: none for Professor

1–2:30 pm TA Mia, SMUDD 207

7:30–9:00 pm TA Daksha, SMUDD 207

Friday: 12:00–2:00 pm

2:30–4:00 pm TA Karime, SMUDD 014**

Please e-mail with questions/concerns: dbenedetto@amherst.edu

Start early.

Show all details and justifications in a nice final draft. No Mess.

Box your answers.