Math 121, Section 01 and 02, Fall 2022

Homework #4

Due **Friday, September 16th** in Gradescope by 11:59 pm ET

Goal: Reviewing Inverse Trigonometric Functions and Limits (no L'Hopital's Rule yet)

Compute each of the following Integrals. Simplify.

1. $\displaystyle\int_2^{2\sqrt{3}} \frac{1}{\sqrt{16-x^2}}\,dx$
2. $\displaystyle\int_0^{\ln 3} \frac{e^x}{3+e^{2x}}\,dx$
3. $\displaystyle\int_0^{\ln\sqrt{3}} \frac{e^x}{\sqrt{4-e^{2x}}}\,dx$
4. $\displaystyle\int_4^{4\sqrt{3}} \frac{1}{16+x^2}\,dx$
5. $\displaystyle\int \frac{x}{\sqrt{1-x^4}}\,dx$
6. $\displaystyle\int \frac{x^2}{x^2+4}\,dx$
7. $\displaystyle\int \frac{2x^2+5}{x^2+1}\,dx$
8. $\displaystyle\int \frac{1}{(1+x^2)\,(5+(\arctan x)^2)}\,dx$
9. $\displaystyle\int_3^9 \frac{1}{\sqrt{x}\,(x+9)}\,dx$
10. $\displaystyle\int \frac{x^2+x+1}{x^2+4}\,dx$

Compute each of the following Limits. Simplify. Use arrows to justify the size arguments.

11. $\displaystyle\lim_{x\to 5^+} \frac{1}{x-5}$
12. $\displaystyle\lim_{x\to 5^-} \frac{1}{x-5}$
13. $\displaystyle\lim_{x\to 8^+} \ln|x-8|$
14. $\displaystyle\lim_{x\to 8^-} \ln|x-8|$
15. $\displaystyle\lim_{x\to 3^+} e^{\frac{2}{x-3}}$
16. $\displaystyle\lim_{x\to 3^-} e^{\frac{2}{x-3}}$
17. $\displaystyle\lim_{x\to\infty} \ln\left(1-\arctan\left(\frac{5}{x^4}\right)\right)$
18. $\displaystyle\lim_{x\to\infty} \ln\left(\frac{\pi}{2}-\arctan x\right)$
19. $\displaystyle\lim_{x\to 4^-} \ln|\ln|x-4||$
20. $\displaystyle\lim_{x\to 0^+} \arctan\left(\frac{\ln x}{5}\right)$

21. Present two different methods to Prove that $\displaystyle\int \frac{1}{4+x^2}\,dx = \frac{1}{2}\arctan\left(\frac{x}{2}\right)+C$

REGULAR OFFICE HOURS

Monday: 12:00–3:00 pm

7:30–9:00 pm TA Aidee, SMUDD 206

9:00–10:30 pm TA Mia, SMUDD 206

Tuesday: 1:00–4:00 pm

6–7:30 pm TA Admire, SMUDD 206

7:30–9:00 pm TA Karime, SMUDD 206

9–10:30 pm TA Ali, SMUDD 206

Wednesday: 1:00-3:00 pm

6–7:30 pm TA Admire, SMUDD 206

7:30–9:00 pm TA Ali, SMUDD 206

Thursday: none for Professor

7:30–9:00 pm TA Aidee, SMUDD 206

9–10:30 pm TA Karime, SMUDD ???

Friday: 12:00–2:00 pm

• Please stop by for help! Try to attend at least one office hour for me and at least one for the Math Fellows each week.

• You can also find help at the Math Fellow (Mia, Aidee, Karime, Ali, or Admire) sessions.