AMATH 567 FALL 2024
HOMEWORK 4 — DUE OCTOBER 21 ON GRADESCOPE BY 1:30PM

All solutions must include significant justification to receive full credit. If you handwrite your assignment you must either do so digitally or if it is written on paper you must *scan* your work. A standard photo is not sufficient.

If you work with others on the homework, you must name your collaborators.

1: From A&F: 2.4.2 c, e.

2: From A&F: 2.4-4 a, b. Use the principal branch where the argument is in $[-\pi, \pi)$. Discuss any ambiguities.

3: From A&F: 2.4.7

4: From A&F: 2.4.8

5: From A&F: 2.5.1 b, e

6: Use the ideas from A&F: 2.5.5 to evaluate $\int_0^\infty \mathrm{e}^{\mathrm{i}z^3 t}\,\mathrm{d}z$, $t > 0$. Express the result in terms of $\int_0^\infty \mathrm{e}^{-r^3}\,\mathrm{d}r$.

7: From A&F: 2.5.6. Repeat this exercise for

$$I_\epsilon = \int_{-\infty}^{\infty} \frac{\epsilon \mathrm{d}x}{x^2 + \epsilon^2}, \quad \epsilon > 0.$$

8: Use a similar method to calculate $\int_{-\infty}^{\infty} \frac{dx}{1+x^4}$.

9: From A&F: 2.6.1 a, e.