Instructions:

• This is an Open Notes Quiz. You can use materials, homeworks problems, lecture notes, etc. that you manually worked on.

• This is **NOT** an Open Internet Quiz. You can only access our Main Course Webpage.

• You are not allowed to work on or discuss these problems with other students or people.

• You can ask a few small, clarifying, questions in Office Hours, but the problems will not be solved for you.

• The main goal is to make a thoughtful and detailed presentation for the solutions. Submit a clear final draft. No mess please.

• Please submit your final work in Gradescope in the Quiz 3 entry.

1. [10 Points] Show that $\qquad \displaystyle\lim_{x \to 0} \frac{\ln(1 - 5x) + \arcsin(5x)}{3xe^x - \arctan(3x)} = \boxed{-\dfrac{25}{6}}$

2. [10 Points] Show that $\qquad \displaystyle\lim_{x \to \infty} \left(1 - \frac{8}{x^3}\right)^{x^3} = \boxed{e^{-8}}$

3. [10 Points] Show that $\qquad \displaystyle\int_0^1 (x + 1)\arctan x \; dx = \boxed{\dfrac{\pi - 1 - \ln 2}{2}}$

Hint: You can work the integral right away OR you can distribute the $\arctan x$ and split it up into two pieces, worked separately.

Optional Bonus: [+ 2 extra points] Compute $\displaystyle\int \ln\left(3x^2 + 4\right) dx$.

This is an optional problem, and you only will get bonus points for a fully correct solution.