Please provide complete and well-written solutions to the following exercises.

Due September 12, at the beginning of class.

Assignment 3

Exercise 1. Find
$$\lim_{x \to \pi/2} (x - \pi/2) \tan(x).$$

Exercise 2. What is
$$\lim_{x \to \sqrt{3}} \frac{\tan^{-1}(x) - \pi/3}{x - \sqrt{3}}?$$

Exercise 3. Using integration by parts, compute the following integrals

- $\int t^2 e^{4t} dt.$
- $\int x \sin(x/2) dx.$
- $\int_0^{1/\sqrt{2}} 2x \sin^{-1}(x^2) dx.$
- $\int_2^4 x (\ln x)^2 dx.$

Exercise 4. Compute the following integrals

- $\int \sin^4(x) \cos^2(x) dx.$
- $\int \cos(x) \sin^{111}(x) dx.$
- $\int \tan^3(x) \sec^2(x) dx.$