1. Find the general antiderivative of $f(x) = e^{-x/2} + \frac{5}{2x + 2} + \frac{1}{3x}$

2. Approximate the area $\int_{3}^{4} x^{-1} \, dx$ using 4 equal subintervals with left endpoints.

3. Express $\int_{0}^{3} x^4 \, dx$ as a limit of Riemann sums.

4. (Mistake: this is discontinuous, so you can’t use FTC on it) Use the fundamental theorem of calculus (FTC) part II to find $\int_{-1}^{1} e^x - \frac{1}{x^2} \, dx$

5. Find $\frac{d}{dx} \int_{0}^{x^3} e^{-5x^2} \, du$

6. Find $\int \left( \frac{x^2 + 5}{2x + 2} \right) \, dx$

7. Find $\int_{0}^{\pi/4} (e^{\cos x} \sin x) \, dx$

8. Find $\int 3xe^{5x} \, dx$

9. Find $\int x^3 \cos x^2 \, dx$

10. Find the partial fraction decomposition of $\frac{1}{x(2x+1)}$

11. Use partial fraction decomposition to find $\int \frac{2x^2 - 3x + 2}{(x^2 + 1)^2} \, dx$

12. Find $\int_{1}^{\infty} \frac{1}{x^{3/2}} \, dx$ if it exists.

13. Find $\int_{0}^{2} \frac{1}{(x-2)^{3/2}} \, dx$ if it exists

14. Suppose we approximated $\int_{0}^{2} \sin(x) \, dx$ using 4 equal width trapezoids. What is the largest the error of this estimate could be (no need to simplify your answer)?

15. Find the third degree taylor polynomial $P_3$ centered about $x = 4$ for the function $f(x) = \sqrt{x}$