Due: August 16, 2024

1. Find all antiderivatives:
   a) x^5
   b) $9x^3 - x + 3$
   c) x
   d) 1
   e) $\sqrt{x}$
   f) $\frac{1}{x^{10}}$
   g) $\frac{5}{x}$

2. For the following exercises, find the antiderivative of the function for the provided endpoints, and compute the area under the curve on that interval.
   a) $f(x) = x^2;\ 1 \leq x \leq 3,\ n = 4$
   b) $f(x) = x^3;\ 1 \leq x \leq 3,\ n = 5$
   c) $f(x) = x^3;\ 0 \leq x \leq 1,\ n = 5$

3. Calculate the following definite integrals:
   a) $\int_1^1 x dx$
   b) $\int_1^2 5 dx$
   c) $\int_1^2 8x^3 dx$
   d) $\int_0^1 4e^{-3x} dx$
   e) $\int_1^4 3\sqrt{x} dx$
   f) $\int_0^5 e^{-2x} dx$
   g) $\int_3^6 x^{-1} dx$
   h) $\int_0^3 (x^3 + x - 7) dx$

4. Bonus! We've talked a lot about linear regression in the last 2 weeks, and we know we can compute regression coefficients with $\beta = (X^T X)^{-1} X^T Y$ Given that X is the left hand side and Y the right, find β. Then use elementary row operations to solve the augmented matrix as given. What do you notice about the results from the regression and those from solving the linear system?

$$\left[\begin{array}{cc|c} 3 & 4 & 2 \\ 1 & 1 & 1 \end{array}\right]$$