Math 152 – Python Lab 1

Directions: Use Python to solve each problem, unless the question states otherwise. (Template link)

1. Suppose you want to build a fence around a *rectangular* enclosure and have 100 yards of material to use. In addition, suppose there is a long brick wall you can use for one of the sides. Let x denote the length (in yards) of the sides perpendicular to the brick wall.

   (a) Write the formula for $A(x)$, the area (in square yards) of the rectangular enclosure surrounded by the fencing, and use Python to expand it.

   (b) What is the area when the sides perpendicular to the wall are 15 yards long each?

   (c) How long does each side perpendicular to the wall need to be to achieve an enclosed area of 1200 square yards? List all solutions if there is more than one.

   (d) Plot $A(x)$ over a domain that *makes sense for this problem.*

   (e) Use Python to find the x value that maximizes the enclosed area.

2. Given $f(x) = x^5(x^3 + 16)^{1/2}$:

   (a) Determine an appropriate substitution to change $\int f(x)dx$ to a du-integral. Include both u and du. (use **sp.Rational(a,b)** to input a fraction a/b in the exponent.)

   (b) Apply the substitutions to f (with or without Python), then (with Python) find the indefinite du-integral. Finally, finish the u-substitution integration process.

   (c) Confirm your answer to part (b) by integrating $\int f(x)dx$ directly (using integrate on f directly). Show that your answers for parts (b) and (c) are the same.

   (d) Use the definite integral from part (b) and the Fundamental Theorem of Calculus to evaluate $\int_{-1}^{1} f(x)dx$.

   (e) Check your answer to part (d) by using Python to directly evaluate $\int_{-1}^{1} f(x)dx$.