MAT021B Discussion Worksheet 1

Problem 1. Meet the other people in your group. Take turns introducing yourselves by answering the following questions:

(a) What is your name?

(b) What are your pronouns?

(c) Where are you from?

(d) What is your major? (If undecided, what's a major you are interested in or are considering?)

(e) What is something you like to do for fun? (If you never have any fun, what is something you would like to start doing for fun?)

(f) What is one goal you would like to achieve before you graduate?

Problem 2. This is a question about the area under the graph of

$$f(x) = x^2 - 4x + 5 \qquad \text{from } x = 0 \text{ to } x = 4.$$

(a) Approximate this area using "Lower Sum" approximation with 4 rectangles of equal width.

(b) Approximate again, this time using "the midpoint rule" with 4 rectangles of equal width.

(c) Sketch a graph of $f(x)$ over the interval $[0, 4]$. Then draw the rectangles associated with your approximation from part (b).

(d) Write the formula (in sigma notation) for the Riemann sum obtained by dividing the interval $[0, 4]$ into 8 equal subintervals and using the right-hand endpoint for each c_k.

(e) Evaluate the sum you found in part (d).

(f) Do part (d) again, but WAIT! This time, instead of using 8 equal subintervals, now use n equal subintervals. Then, find a formula for your Riemann sum. Hint: remember that

$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2} \qquad \text{and} \qquad \sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}.$$

(g) Take a limit of your answer from part (f) as $n \to \infty$ to calculate the area under the curve over $[0, 4]$.