Format of TA Sessions

We meet twice each week. (See Canvas for the schedule).

The first weekly meeting is to practice some of the material covered earlier in the week. I will carefully go through the examples, but I highly encourage everyone to think it through with me and try to answer my questions. **People learn best through trial and error so don’t be afraid to make a mistake.** Also, I want to encourage the class to listen to each other’s ideas and give feedback to each other.

The second meeting is to work together on the problem set. It is my hope that everyone comes to work on the problem set and when people get stuck, people can ask their peers or me for help, but I will purposefully offer only vague/indirect help because I want the class to help each other when someone is stuck on a problem. **This helps everyone involved learn better and doing problem sets together will be much faster than doing problem sets alone.** Of course, I will be keeping a watchful eye on the discussion to make sure no misunderstandings propagate. I will also be available to answer questions about the course material.

Icebreaker

In pairs, you will tell your partner the following information about yourself:

1. Your name.
2. Where you are from.
3. Favorite something.
4. Something you think you’re good at.
5. Something you really want to get better at.
6. If you had to describe yourself in one word, what word would you choose.

Do not write anything down and try to remember this information. You will introduce your partner to the class.
5.1

1. Suppose we approximate the area under the graph of $f(x) = x^2 - 1$ from $x = 0$ to $x = 2$ using 4 rectangles and the left endpoints. Do we expect an underestimate or overestimate? Do the actual approximation to confirm our expectation.
2. Determine a region under a graph whose area is equal to

\[
\lim_{n \to \infty} \sum_{k=1}^{n} \frac{2}{n} e^{1+\frac{2k}{n}}
\]
1. Write down
\[ \lim_{n \to \infty} \sum_{k=1}^{n} \frac{2}{n} e^{1+\frac{2k}{n}} \]
as a definite integral.
2. The graph of the velocity $v(t)$ of a certain bug is a piecewise linear graph. From $t = 0$ to $t = 2$, $v$ increases from 2 to 4. From $t = 2$ to $t = 4$, $v$ stays constant and from $t = 4$ to $t = 6$, $v$ decreases to $-2$.

Calculate $\int_0^4 v(t)dt$, $\int_4^6 v(t)dt$, $\int_6^0 v(t)dt$. What do these quantities represent?
1. Let \( g(x) = \int_0^x f(t) \, dt \), where \( f \) is the function whose graph is shown.
(a) Evaluate \( g(0) \), \( g(1) \), \( g(2) \), \( g(3) \), and \( g(6) \).
(b) On what interval is \( g \) increasing?
(c) Where does \( g \) have a maximum value?
(d) Sketch a rough graph of \( g \).
2. Let $f(x) = \int_0^x \ln(t^2 + 1)dt$. Find a formula for $f'(x)$. 
1. Compute $\int \sqrt{x}(x^2 + 2x + 3) \, dx$. 
2. Compute $\int_1^4 \frac{2+3t}{\sqrt{t}} \, dt$. 
5.5

1. Compute \( \int x \sqrt{x + 2} \, dx \).
2. Compute \( \int \frac{\cos x}{1 + \sin^2 x} \, dx \).