MTH 252Z Lab
Areas

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Prompts

1. Respond to each of the prompts below that are about the conceptual understanding of a Riemann sum.

   (a) What does each of i, n, and a_i represent in the expression $\sum_{i=1}^{n} a_i$?

   (b) What does L_n and R_n represent? Given the graph of a continuous function, can you draw what L_n and R_n would represent?

   (c) What is Δx? As n increases, what happens to Δx?

2. The graph of $f(x) = 2\cos\left(\frac{\pi}{4}x\right) + 3$ where $-2 \leq x \leq 3$ is graphed below. Copy the graph of f onto your lab. Approximate the area of the highlighted region using R_5, and draw an interpretation of R_5 on your graph. Use exact values – do not round!
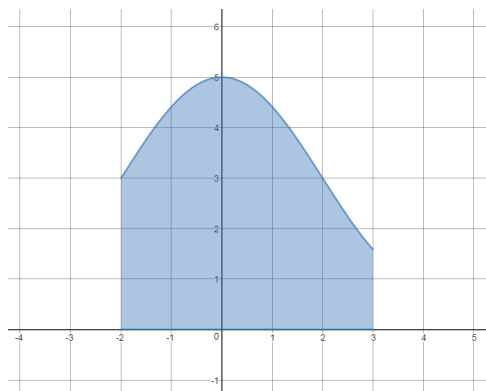

Figure 1: The graph of $f(x) = 2\cos\left(\frac{\pi}{4}x\right) + 3$ where $-2 \leq x \leq 3$.

3. Speedometer readings every five seconds of a car are given below:

Time (s)	0	5	10	15	20	25	30
Velocity (mph)	17	21	24	29	32	31	28

   About how many feet did the car travel in these 30 seconds? Use an approximation method similar to what we covered in class to obtain your conclusion. *This is not a trivial problem. Be aware of the units.*

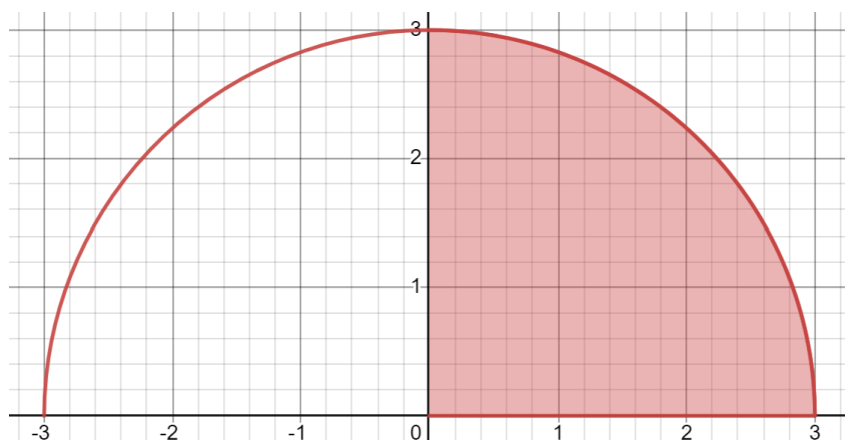4. A semicircle is graphed below with a region highlighted.

Figure 2: The graph of a semicircle with a highlighted region.

(a) Write down a function $f(x)$ for the graph of the semicircle. Use this function to complete the next part.

(b) Use L_6 to approximate the area of the highlighted region. Round your conclusion to the nearest tenth.

(c) Find the exact value of the highlighted region. *Hint: Calculus is not required to do this.*

(d) How accurate is L_6 in finding the area? Would L_4 be more or less accurate? Would L_8 be more or less accurate?