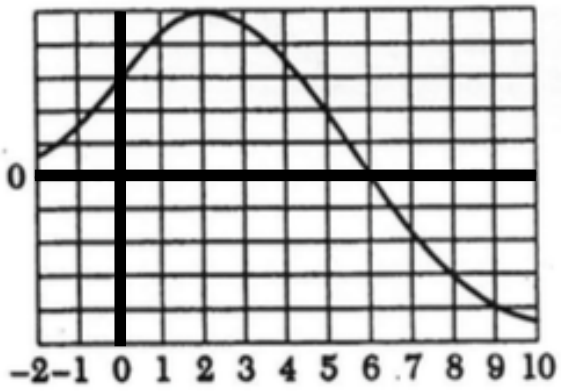
1. What does the *Fundamental Theorem of Calculus (Part 1)* say?

2. Evaluate $A'(x)$ when:
   (a) $A(x) = \int_0^x t^2\,dt$ (b) $A(x) = \int_3^x t^3\,dt$

   (c) $A(x) = \int_x^5 \ln(t)\,dt$ (d) $A(x) = \int_3^{x^2} 7^t\,dt$

3. Let $A_f(x) = \int_0^x f(t)\,dt$ where $f(x)$ is the function in the graph.



   (a) Which is larger: $A_f(1)$ or $A_f(5)$? Justify your answer.
   (b) Which is larger: $A_f(7)$ or $A_f(10)$? Justify your answer.
   (c) Which is larger: $A_f(-2)$ or $A_f(-1)$? Justify your answer.
   (d) Where is $A_f(x)$ increasing?
   (e) Explain why $A_f(x)$ has a stationary point at $x = 6$. Is this a local minimum or a local minimum?
   (f) Let $F(x) = \int_{-2}^x f(t)\,dt$. Explain why $A_f(x) = F(x) + C$ where C is a negative constant.
   (g) The five numbers $A_f(4) - A_f(3)$, $A_f(5) - A_f(4)$, $A_f(6) - A_f(5)$, $A_f(7) - A_f(6)$, and $A_f(8) - A_f(7)$ can each be interpreted as the slope of a secant line of $A_f(x)$. Explain.
   (h) Explain how to use the graph of $f(x)$ to determine the concavity of $A_f(x)$ on the interval $[3, 8]$.
   (i) Rank the five numbers 0, $A_f(-1) - A_f(-2)$, $A_f(0) - A_f(-1)$, $A_f(1) - A_f(0)$, and $A_f(2) - A_f(1)$ in increasing order. Explain your reasoning.

4. Revisit question 3. Answer each subquestion using *only* the Fundamental Theorem of Calculus. [The word *area* cannot be used in any of your explanations.]

5. You work for Acme Can Company. A standard ACC juice can (which you can assume to be a cylindar) has a volume of 355 cm^3.

   (a) Find the dimensions (radius r and height h) that minimize the surface area of the can.

   (b) How can you check your answer? Do it.

6. A rectangle has its base on the x-axis, a vertex on the y-axis, and a (different) vertex on the curve defined by $y = e^{-x^2}$.

   (a) What choice of vertices gives the largest area?

   (b) Show that one of the vertices found in part (a) is at an inflection point of the curve.