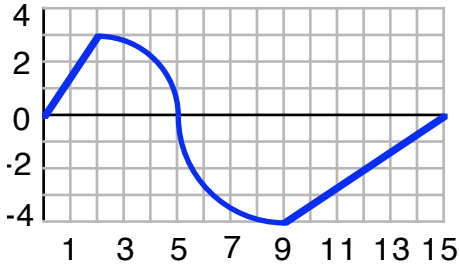
1. In the following exercises, evaluate the integral assuming that f is the function shown below. [Note: The graph of f consists of two straight lines and two one-quarter circles.]



   (a) $\int_0^{15} f(x)\,dx$

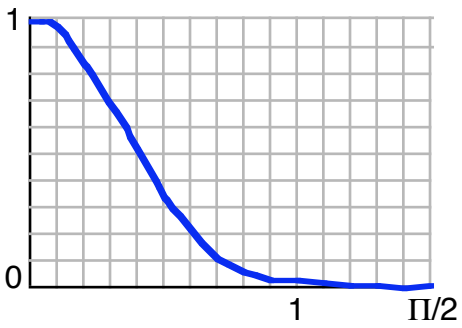
   (b) $\int_9^{12} f(x)\,dx$

2. Evaluate $\int_{-2}^{1} w\,dw$ by

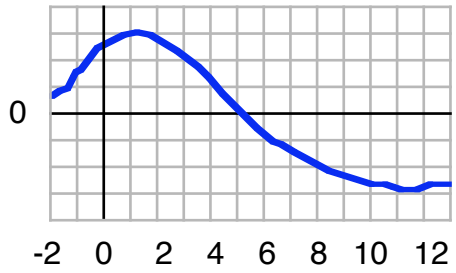
   (a) using a graph of the integrand over the interval of integration

   (b) using antiderivatives and the Fundamental Theorem of Calculus

3. Four students disagree on the value of the integral $\int_0^{\pi/2} \cos^8(x)\,dx$. Jack argues for $\pi \approx 3.14$, Joan for $35\pi/256 \approx 0.43$, Ed for $2\pi/9 - 1 \approx -0.30$, and Lesley for $\pi/4 \approx 0.79$. Use the sketch of the graph of $\cos^8(x)$ shown below to determine who is right. (One of them *is* right!) Explain how you know that the other values are incorrect.



4. Let $A_f(x) = \int_0^x f(t)\,dt$, where f is the function graphed below. Use the definition of the integral as *signed* area to answer the following questions:

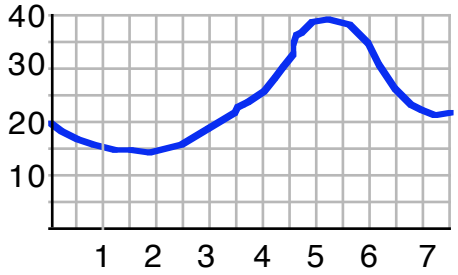


   (a) Explain why $A_f(-1) < 0$.

   (b) Which is larger: $A_f(-2)$ or $A_f(-1)$? Justify your answer.

5. Let $G(x) = \int_5^x f(t)\,dt$, where $f(t) > 1$ for all $t \geq 0$. Is it possible that $G(10) = 3$? Justify your answer using the definition of the integral as signed area.

6. $F(x) = \int_0^x f(t)\,dt$, where f is the function whose graph is shown below. Use either the definition of the integral as signed area *or* the FTC to answer the following questions:



   (a) Is F decreasing at $x = 1$? Justify.

   (b) Is F concave up at $x = 1$? Justify.

   (c) Suppose that g is a function such that $g(0) = 2$ and $g'(x) = f(x)$ for all x. How are the graphs of F and g related?