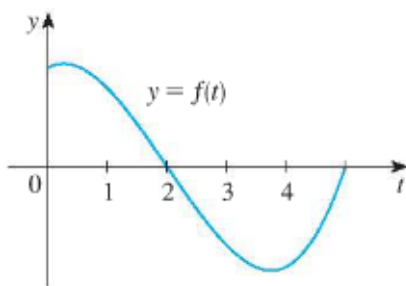**Turn in the following problems:**

1. If $\int_1^5 f(x)\,dx = 12$ and $\int_4^5 f(x)\,dx = 3.6$, find $\int_1^4 f(x)\,dx$
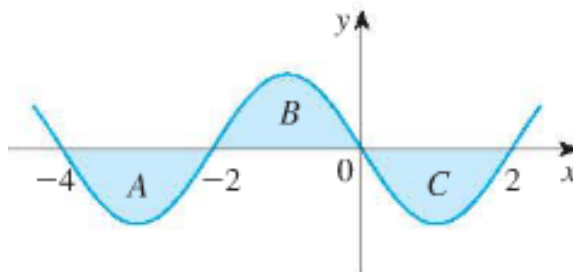
2. If $F(x) = \int_2^x f(t)\,dt$, where f is the function whose graph is given, which of the following values is the largest? Explain your reasoning.

   (a) $F(0)$
   (b) $F(1)$
   (c) $F(2)$
   (d) $F(3)$
   (e) $F(4)$

3. Each of the regions A, B, and C bounded by the graph of f and the x-axis has area 3. Find the value of

$$\int_{-4}^{2} [f(x) + 2x + 5]\,dx$$

4. Fill in the blank with "all", "no", or "some" to make the following statements true. Note that "some" means one or more instances, but not all.

   - If your answer is "all", then give a brief explanation as to why.
   - If your answer is "no", then give a brief explanation as to why.
   - If your answer is "some", then give two specific examples that illustrate why your answer it not "all" or "no".

   An example must include either a graph or a specific function.

   (a) For _____ functions f, $\int_1^3 f(x)\,dx$ is the area between the graph of f and the x-axis on $1 \le x \le 3$.

   (b) For _____ functions f, if $f(x)$ is a continuous function, then $\int_0^2 f(x)\,dx \le \int_0^3 f(x)\,dx$.

   (c) For _____ functions v, on the interval $a \le t \le b$, the integral of the velocity $v(t)$ is the total distance traveled from $t = a$ to $t = b$.

   (d) For _____ real numbers n, $\int x^n\,dx = \dfrac{x^{n+1}}{n+1} + c$.

   In mathematics, we consider a statement to be false if we can find any examples where the statement is not true. We refer to these examples as counterexamples. Note that a counterexample is an example for which the "if" part of the statement is true, but the "then" part of the statement is false.

5. Use geometry to compute the value of the following integrals (this is not asking about total area). Be sure to provide a graph of the function and explain how you used geometry to compute the value of the integral.

   (a) $\int_{-2}^2 e\,dx$

   (b) $\int_{-4}^0 \sqrt{16 - x^2}\,dx$

   (c) $\int_{-1}^3 5 - 2x\,dx$

6. A fellow calculus enthusiast was working through some practice problems. They come to you asking if the following problem is correct:

$$\int \frac{3x^2 + 1}{2x}\,dx = \frac{x^3 + x}{x^2} + c$$

   Determine if they are correct. Explain how you know if they are correct without integrating the function (i.e. find another method using calculus).