CLARK

Math 121 Calculus

Quiz on integrals, answers

January 2015

Scale. 8–9 A, 6–7 B, 5 C. Median 9, A+.

1. [3] Suppose that $\int_4^5 f(x)\,dx = 7$ and $\int_4^5 g(x)\,dx = 3$. Determine the value of the integral $\int_4^5 (2f(x) - 4g(x))\,dx$

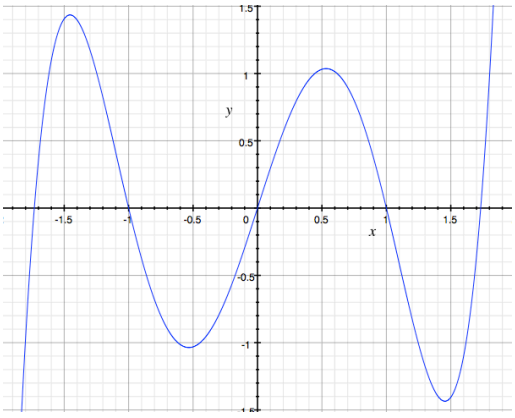
$$\int_4^5 (2f(x) - 4g(x))\,dx = 2\int_4^5 f(x)\,dx - 4\int_4^5 g(x)\,dx = 2 \cdot 7 - 4 \cdot 3 = 2$$

2. [3] Evaluate the integral $\int_{-1}^1 (3x^2 + 5x - 6)\,dx$.

Use the Fundamental Theorem of Calculus. Find an antiderivative of the integrand and evaluate it between the limits of integration.

$$\int_{-1}^1 (3x^2 + 5x - 6)\,dx = x^3 + \tfrac{5}{2}x^2 - 6x\Big|_{-1}^1 = (1 + \tfrac{5}{2} - 6) - (-1 + \tfrac{5}{2} + 6) = -10$$

3. [3] The graph of an odd function f is shown below. (Recall that a function is *odd* if $f(-x) = -f(x)$ for all x.) Determine the integral $\int_{-1}^1 f(x)\,dx$. Explain your answer in a sentence.



The region below the x-axis on $[-1, 0]$ and the region above the x-axis on $[0, 1]$ are congruent, but the signed area of the former is negative while the signed area of the latter is positive. They cancel out giving 0 for the value of the integral.