

1. What is the difference between an antiderivative of $f(x)$ and $\int f(x) dx$.
2. Find all antiderivatives of $f(x) = 3x^3 + 7x + 9$.
3. Evaluate the following indefinite integrals.

(a) $\int x(x^{1/2} + x^3 + 1) dx$

(b) $\int 3x^2(x^3 + 7)^4 dx$

(c) $\int \frac{x^7}{x^8 + 9} dx$

(d) $\int t^7 + 9t^2 + e^t + 5 dt$

(e) $\int \frac{\sqrt{x} - 4}{\sqrt{x}} dx$

(f) $\int e^2 dx$

(g) $\int \frac{\ln x^2}{x} dx$

(h) $\int \frac{x^3 + 7x^2 + 9x + 45}{x^2} dx$

(i) $\int x^2 e^{x^3} + \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$

4. Solve the following Initial Value Problems.

(a) Find a function $f(x)$ such that $f'(x) = 7x^5 + \frac{9}{x^2} + \frac{3}{x^3} + e^x$ and $f(1) = 2$.

(b) Find a function $f(x)$ such that $f'(x) = e^{5x}$ and $f(7) = 9$.

5. Find the area under the following curves using geometry. (i.e. Do not appeal to the Fundamental Theorem of Calculus. i.e. Do not anti-differentiate.)

(a) $f(x) = \sqrt{4 - x^2}$ on $[-2, 2]$. (What common shape is this?)

(b) $f(x) = 3x - 6$ on $[2, 5]$.

These last four problems are your written homework problems due Friday December 3. Feel free to get a jump start on it!

6. Evaluate the integral $\int xe^{-x^2} + \frac{e^x}{e^x + 3} dx$.

7. Evaluate the integral $\int x^3(x^2 + 1)^{3/2} dx$. (There is a hint in the text for this one, fwiw.)

8. True or False. If $f(x)$ is continuous then $\int xf(x^2) dx = \frac{1}{2} \int f(x) dx$.
9. Tell me about $\int_a^b f(x)dx$. (Your answer should include what it is, what it does, where it comes from, how to compute it, etc. Indeed, this question is intentionally vague. I'd recommend reading your notes from class on Thursday, November 18. If you were not in class that day perhaps you should look at sections 6.3 and 6.4 in your text. Your answer should be about a paragraph in length. It should be more than a sentence but less than an essay. Also, this problem will be worth 10 points.)